

# The Simple Plant Isoquinolines

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### Definitions:

Consider botany. What is a taxon? It is the name which identifies a plant. A taxon is made of two parts. First, there is the genus, which is a general name given to a group of closely related plants. Second, there is the species, which is the distinguishing name given to a specific plant in that group. A taxon is always written in italics. Thus, for example, *Pachycereus pecten-aboriginum* is the name of a cactus.

Consider chemistry. What are isoquinolines? These are chemical structures built around a two-ring compound. This compound, Isoquinoline, consists of a benzene ring and pyridine ring fused together at a specific bond. There is a pattern of substitution that gives an isoquinoline its absolute definition. Thus, for example, Salsoline is an isoquinoline, which is a major component of the *Pachycereus pecten-aboriginum* plant.

One can identify a plant by what it looks like, or by what is in it. One can identify a natural compound by its structure, or by what plant it is in. Know one, find the other. This reference book has been designed to make this cross-identification easier to achieve.

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## FOREWORD I

The passion of my life over the last forty years has been a compelling interest in psychedelic drugs. They have given me not only an exciting area of research and discovery, but also a personal understanding of just who I am and why I am. Certainly these guides and sacraments will eventually play an accepted role in our community and in our culture. Almost all of these drugs have either been isolated from psychoactive plants, or are the results of subtle variations of the molecular structures of these isolates.

I have always looked at these plants and the compounds they contain in the same way that the Romans dreamt of their ultimate empire. It was Caesar who acknowledged that all of Gaul was divided into three parts and to understand it, to conquer it, each part had to be respected as a separate entity. It is exactly the same way with understanding the world of psychedelic drugs. There are three domains of inquiry that must be studied independently before one can begin to appreciate just how they might integrate into a single concept. These three are now, I believe, coming together.

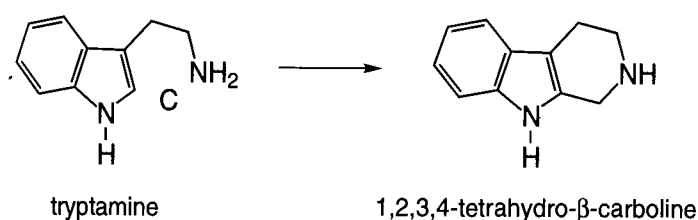
One part is the large collection of psychoactive compounds known as the phenethylamines. The first known plant psychedelic was mescaline, or 3,4,5-trimethoxyphenethylamine. This simple one-ring alkaloid was discovered in the North American dumpling cactus Peyote (*Anhalonium williamsii*) in the late nineteenth century, and is now known to be a component of over fifty other cacti. Over a dozen other cactus phenethylamines have been isolated and identified, and there are perhaps a hundred synthetic analogues that are now also known to be psychedelic in action. This body of information has been published by my wife Ann and me as a book entitled "PIHKAL: A Chemical Love Story." PIHKAL stands for Phenethylamines I Have Known and Loved.

An almost-as-large chemical group contains the tryptamines. N,N-Dimethyltryptamine (DMT), its 5-hydroxy analogue (bufotenine) and the O-methyl ether homologue 5-methoxy-N,N-dimethyltryptamine (5-MeO-DMT) are widely distributed in the world of natural plants. There are also the well-established mushroom alkaloids 4-phosphoryloxy-N,N-

dimethyltryptamine (psilocybin, and the dephosphorylated indolol psilocin) and the mono- and didemethylated homologues baeocysteine and norbaeocysteine. These seven natural alkaloids have provided the template for perhaps two dozen analogue structures that are now well-established psychedelic agents. Ann and I have written a companion volume to PIHKAL called "TIHKAL: The Continuation" (TIHKAL stands for Tryptamines I have Known and Loved), which has brought together most of these natural and synthetic tryptamines into a single reference site.

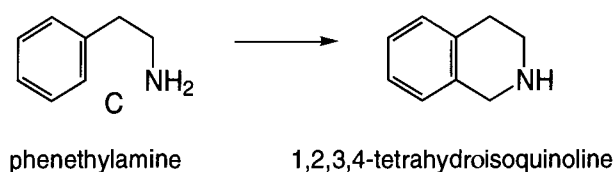
The remaining third of the above Gallic synthesis deals with what I had originally called the "Q" compounds, as distinguished from the "P" compounds and the "T" compounds (the phenethylamines and the tryptamines). The actual parent structural element is the isoquinoline ring system, and my initial plan was to give this third book a name similar to the first two. IiHKAL wouldn't do it, but QIHKAL shows a good bit of class, at least in my opinion. Or maybe THIQIHKAL because most of them are really tetrahydroisoquinolines. Well, all these names are now on hold, as Ann is uncomfortable with them. No name has yet been decided upon, but ideas such as The Third Book, or Book Three, are under consideration. Names like these resound with a rather striking arrogance, if nothing else.

To understand the relationship of the isoquinolines to the phenethylamines and the tryptamines, the concept of ring closure must be used. This is a sort of synthetic scorpion sting at the molecular level. A tryptamine has an indole ring as its centerpiece and from it there extends a floppy two-carbon chain terminated by an amino nitrogen atom. A small but very important family of plant alkaloids is the product of this amine exploiting a carbon atom from somewhere, and making a new six-membered ring by that "sting" reaction back onto the parent indole ring. This family has the name,  $\beta$ -carbolines, and the formed compound is 1,2,3,4-tetrahydro- $\beta$ -carboline.



A phenethylamine has a benzene ring as its centerpiece and it, too, has a floppy two-carbon chain extending out from it and also terminating in an amino group. In a reaction that is exactly analogous to that of the tryptamines, this amine can pick up a carbon atom and bend back to react

with the parent benzene ring forming a six-member ring. This is the origin of the isoquinoline family of natural products, and the formed compound is 1,2,3,4-tetrahydroisoquinoline.



As mentioned above, this third part of the plant psychedelic alkaloid world involves tetrahydroisoquinolines and is the substance of our third book. A very reasonable appendix to be written for this book would be a search of the chemical literature for the known isoquinolines that might be of interest as pharmacological agents. There are certainly many plant products, as well as a monster inventory of synthetics, some of which are made based on plant examples, but many others are simply laboratory creations of the imaginative chemist.

It was soon apparent that this compilation would become unmanageably large. The first major trimming was the elimination of the compounds that were synthetic, and the limitation of the listing to those compounds that have been reported as plant products. These isoquinolines could play the dual role of serving not only as potential contributors to the action of psychoactive plants but also as prototypes for the synthesis of new materials that might themselves be biologically active.

But even this restriction to only plant compounds was not sufficiently severe. There seemed to be no end to existing isoquinoline treasures. As I wandered deeper into the literature, I kept finding an ever-increasing inventory of research papers that described fantastic stuff. As a totally make-believe example, pretend that there was a compound named Dogabinine that has only been found in the Dogabic tree in the Twathtu rainforest, which the natives say cures leprosy, and which has a complex chemical structure that just happens to carry an isoquinoline ring in its lower southwest corner. To include all such monsters would make the appendix many thousands or even tens of thousands of pages long. And if you were to add into this compilation all the known derivatives, extensions and chemical modifications of Dogabinine, then you would have a review entity that would be several volumes in length. If such a collection were to exist, I would have it in my library right now. But it does not exist and it may never exist.

Some middle ground, some rational compromise, had to be found. I wanted this collection to present all isoquinolines that are known to be plant alkaloids, but respecting carefully defined restrictions that exclude horror monsters such as Dogabinine. The final compromise was to establish separate entries for all the known two-ring isoquinolines that are from natural sources, including those that carry a third ring as a substituent (such as a benzyl group) at the 1-position. And within each of these entries, there are included all natural alkaloids that can be seen as products of a hypothetical attack of an ortho hydrogen of this substituent on some other position of the isoquinoline nucleus. This "ortho-X attack" is exactly defined and illustrated in the Foreword that follows. All plant sources are recorded (or representative sources if there are too many) and literature citations are also included in each entry.

But even with these restrictions, this "appendix" to a third book was becoming larger and larger, and it soon became apparent that it was totally inappropriate. There would be far too many pages for a minor appendix in a book that is to be dedicated to cactus and isoquinolines. And by the time my stream-of-consciousness commentary was added in the text where I felt it should be added, the mass increased to the extent that it had to be a reference book in its own right.

Voila. Let's try to get all that information together into a single modest package and make it available to the chemists and botanists who might want it. Should it be a review article in *Chemical Reviews* or the *Journal of Natural Products*? Several factors said "No." Most botanical review surveys are not searchable except by taxon name (that would assume that you would know the plant from which it came) or by some complex and maddening *Chemical Abstracts* entry that dealt with some alphabetization that demanded the knowledge of the structure and the way the structure would be listed. And most review articles also insist on a tidy format that is without editorial comment and does not contain volunteered ideas and extrapolations.

An obvious solution became apparent. Create a single reference book to contain all this information. Use the chemical substituents as an alphabet. Visually travel around the structural image of the molecule in a logical direction, address the substituent groups in some logical way which will be called alphabetical, and progress until you find the target you are searching for, or until you find an empty hole where it would have been had it been known. So this book has come into existence simply to meet this need, and to relieve the potential "Third Book" readership of a killer of an appendix.

The nature of the substituents and, especially, the connection between simple benzylated isoquinolines and the nature of the cyclized products of ortho attacks, are the heart and substance of this review book.

One additional comment is essential in this introduction. The extensive literature searching, and commingling of the accumulated plant and chemical data, taxed my capability and exceeded my patience. This was indeed a compilation that was essential to my current cactus research for the third book, but the task of its organization created a disruptive interference to my exploration of new psychedelics in unanalyzed cacti. The early help given me by Ann's daughter Wendy quickly evolved into her playing an indispensable role as my co-author. The final organization and structuring of this book has been largely the result of her dedicated labor. It is an honor to share the authorship with her as, without her help, this book would not exist today.

Alexander T. Shulgin



## FOREWORD II

When Sasha and I began this project it was meant to be an appendix for the next book in the series of PIHKAL and TIHKAL. It became so big that we knew after some time it could not be an appendix; it was its own book. So here it is, a collection of all the information we've compiled over the last two years. It's been a daunting project at times. If we had included all the variations of isoquinolines that we had originally planned to, this book would have been a series of volumes. Along the way we had to make decisions about what was important to keep in, what we could leave out, what our focus was, what our intentions were. We pared down constantly, finally settling on the criteria that Sasha has laid down in the introduction.

It is my belief that what we have put together here will be of great use to anyone interested in this particular field of botany and chemistry. We have tried to make the information as easy to find and review as possible, taking into consideration what it was like for us to search through the literature. Hopefully this compilation will make others' work much easier. We found so many mistakes in the literature, and even in the Chemical Abstracts, that we had to make educated guesses as to the correct way something was spelled, or what a certain substituent was on a given ring; sometimes we simply made comments in the text about a particular discrepancy. We welcome corrections and comments that come to us, as we surely have made errors ourselves.

What I observed while going through the literature was enlightening. What stood out for me was how much of the plant research done on isoquinolines has been in countries other than the United States. As many people know, the state of objective, independent scientific research in this country is a sad one. Research is at the mercy of special interests, government funding, and of harsh regulations and restrictions. It's rare to have a situation where a scientist is free to explore and discover, much less encouraged to do so. We are left to rely on research done in countries where the scientists' findings are not bought and paid for in advance, as happens in this country too often. Sasha is a rare chemist indeed, working independently for so long, free of those controls, and following his passion to discover tools to understand the mind and the brain in the face of

much misunderstanding and misguided assumptions about psychoactive materials. As it is now, the pharmaceutical industry is bridging the gap between what is socially and legally acceptable to do to one's brain chemistry in order to feel well, and what is currently considered unacceptable, which is using chemical or plant medicines to look at why one is not feeling well to begin with.

There is great hypocrisy, fear, and thoughtlessness afoot in the United States regarding psychoactive drugs. Their benefits and potential uses are lost in the rhetoric of the "drug war," and in the fear that it generates. There are many examples of healthy and informed use of psychoactive medicines throughout the world, and throughout the ages. They have been used in the past, and are being used today, as healing tools. We need that kind of thinking in this country, we need that kind of healing.

Hypocrisy exists in the laws regarding alcohol and tobacco, which are legal, and are the most damaging and widely abused drugs in our culture. Many pharmaceutical drugs are not without their dangers and abuses as well (it's a fact that far more Americans die from pharmaceutical drugs than illegal drugs). What are the fears of psychoactive drugs really based on? I encourage those who start with the arguments of brain damage caused by this or that drug to obtain the actual scientific papers that make those claims (not just the titles of the papers) and read them carefully. They will find much misinformation due to political pressure, economics, and fear.

It's been a blessing to work with Sasha, who is not only a brilliant chemist but a fantastic teacher. I had no background in chemistry when I began working with him; he has taught me so much. His passion and enthusiasm for chemistry is infectious; he has made it a delight to learn, and has shown me how magical it all is. It is magical, and mysterious, this world we live in and the stuff that it and we are made up of. It should be cherished, protected, and explored, with honesty and courage.

Wendy E. Perry

## INTRODUCTION

For this book to serve as a completely satisfactory reference, it must be structured so that a reader who comes to it with one specific word in mind that is related to the simple, natural isoquinolines, can immediately locate all other related entries. Total cross-referencing is needed. As a way to simplify this type of search, the main part of this book is actually a collection of three indices. Each index is arranged alphabetically, very much like a dictionary. The first index lists the common trivial names, the second lists the structures of the compounds themselves and the plants that contain them, and the third lists the taxonomic names of these plants and the compounds that have been found in them.

Part 1: Trivial names of the plant alkaloids:

All of the known simple plant isoquinolines have been entered into this index under their common, or trivial names. Originally, there was a linear structure code attached to the trivial name entry which allowed the reader to immediately deduce the chemical structure and to access the compound directly in the structural index. It became apparent that a single page reference would do as well. Each trivial name thus leads to the chemical structure, the plants that contain that compound, and appropriate literature references.

Many compounds have a number of trivial names. These may be pure synonyms for a single compound, or they may distinguish different structural or optical isomers. The quaternary amine alkaloid salts present an unusual problem. There are three naming procedures that are frequently encountered. The quaternary salt may have a distinct one-word name. Here there is no problem. However, the other two examples are two- or three-word names, with the anion involved being incorporated into the second word. As the fourth alkyl group on the nitrogen is usually a methyl group, the anion name would take one of two forms. If the parent tertiary amine is, say, the alkaloid Canadine, then the methyl quaternary salt could be called either N-Methylcanadinium iodide or Canadine methiodide. Both are faulted in that the presence of the iodide anion in the product is the work of

the analyst, and it is not what was originally present in the plant. And if five people were to independently isolate this plant product and characterize it as a salt using the anions chloride, iodide, picrate, perchlorate and oxalate (all commonly found in botanical papers) it would demand five different index entries for a single plant alkaloid. In this present compilation, N-Methylcanadine quat will be the name used. But some quaternary amines are internally tetra-substituted. With compounds such as the berberines where the c-ring is aromatic, there is no external "methyl" group to call upon. Here, using Caseadinium iodide as an example, the anion will also be dropped and it will be listed as Caseadinium quat.

#### Part 2: Structural formulae of the plant alkaloids:

The second, and major, index is the collection of structures and their plant sources. This section is also organized in an alphabetical way, but clearly the use of the classical A to Z order does not apply to the various arrangements of atoms. Let's say you have the structure of a simple isoquinoline in mind, and you would like to know if it is a known plant alkaloid. The classic academic process is to head over to the University library and start going through the many collected indices of the Chemical Abstracts, and search it out by what you hope is the right chemical name. But sadly the rules of naming are continuously changing. Sometimes 5,6,7,8-tetramethoxy precedes 1,2,3,4-tetrahydro, and sometimes it follows it. Sometimes 6,7-methylenedioxy-1,2,3,4-tetrahydroisoquinoline is filed in just that way, but sometimes it is filed under benzodioxolo[4,5-g]5,6,7,8-tetrahydroisoquinoline. And just what are the Chemical Abstracts' structural naming rules and numbering systems for four-ring systems such as aporphines, isopavines or berberines?

The "alphabet" used in this structural index is totally indifferent to the capricious and arbitrary rules laid down by the Chemical Abstracts. Quite simply, it is based on the location of the substituents and their identity in the nuclear isoquinoline skeleton before it is distorted by a hypothetical "ortho attack." The definition of this "atomic" alphabet is the substance of this introduction. The nature and variety of this "ortho attack" is addressed here as well.

#### Part 3: Botanical names for the plants that contain these alkaloids:

All plants have been entered into the third index alphabetically, according to genus and species. Under each of these taxa are listed the trivial (or chemical) names of the alkaloids reported to be in that plant.

## Part 4: Appendices:

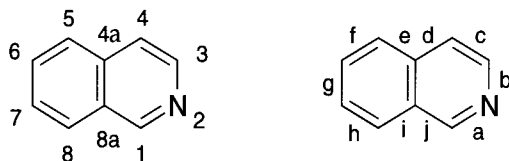
There are three appendices located at the end of this volume. The first is a listing of the botanical families that are mentioned in this book, and the Genera that each contains. Second is an analysis of the non-intuitive process used by Chemical Abstracts to create the name of an isofuranone-substituted isoquinoline. The third is the list of actual journal names that are given only as initials in the references in the structural index.

## THE ATOMIC ALPHABETIZATION OF COMPOUNDS

There are two "alphabets" used in the organization of this book. Both the index of trivial names and the listing of the botanical binomials use the English A to Z, 26-letter convention, like a dictionary, and the words can be of any length. The listing of compounds in the structural index is also "alphabetical," but it employs a hierarchy of positional locations and structural substituents as its alphabet. Each structure is a five-lettered "word" and the priority follows the rules of the dictionary. With the structure being sought in mind, one must go through the list of compounds with the first "letter" (substituent) in mind, and then the second "letter" is located, and on, and on. Below is a list of the priorities each substituent ("letter") follows.

## (1) POSITION ON THE AROMATIC RING

Here is the primary assignment of numbered positions, and the assignment of letters to the individual bonds, of the isoquinoline ring:



The first "letter" of the chemical name of the structure being sought is created from the position of the substituents on the aromatic benzene ring. There are four positions available (5,6,7,8), and they are alphabetically arranged from small to large and from few to many.

This is the order:

none	5	5,6	5,6,7	5,6,7,8
	6	5,7	5,6,8	
	7	5,8	5,7,8	
	8	6,7	6,7,8	
		6,8		
		7,8		

Thus a compound with a 5,6-disubstitution pattern is to be found in this dictionary immediately following the 8-monosubstituted entries and immediately before the 5,7-disubstituted entries. All numbering has been taken exclusively from the assignments given to the isoquinoline ring. There are situations such as the methylenedioxy-isoquinolines where the nature of the substituent constitutes a new ring. In this case, as in many others, Chemical Abstracts would assign totally different numbers to these four positions on the aromatic ring. Currently correct numbering systems are ignored here, and the primitive 5,6,7 and 8 positional identifiers are used exclusively. This first letter of the structural alphabet is used as a heading for the appropriate subsection of the second index, the structural formula group.

## (2) THE SUBSTITUENTS ON THE AROMATIC RING

The second "letter" of the chemical name is the actual substituent or substituents found at the positions designated by the numbers above. There are only three substituents to be considered in this chemical alphabetical sequence; they are, in order:

code used:	atomic connections:	common name:
HO	HO-	(hydroxy)
MeO	CH <sub>3</sub> O-	(methoxy)
MDO	-OCH <sub>2</sub> O-	(methylenedioxy)

The HO- group is exactly what it appears to be. It is a hydrogen atom bonded to an oxygen atom which is, in turn, bonded (at least in the case of the second letter of this chemical alphabet) to one or more of the available positions on the aromatic ring of the isoquinoline, i.e., the 5,6,7 and/or the 8 positions. The MeO- group, as drawn, is an ab-

abbreviation for a slightly more complex structure, a methyl group ( $\text{H}_3\text{C}$ - or  $-\text{CH}_3$ ) bonded to an oxygen atom which is, as above, attached to one (or more) of the four positions of this aromatic ring. The MDO, or methylenedioxy group, is yet a bit more complex. It is unique in that it is a double-ended substituent. It is a short chain that involves an oxygen atom (O) connected to a methylene group ( $\text{CH}_2$ ) connected in turn to another oxygen atom. Drawn out as a collection of atoms it is  $-\text{OCH}_2\text{O}-$  and thus requires two adjacent substituent positions and must be associated with two numbers.

Let's use the 5,6 substitution position as an illustration template, and we'll introduce some substitution second "letter" examples, in alphabetical order:

5,6 HO HO	— precedes —
5,6 HO MeO	— precedes —
5,6 MeO HO	— precedes —
5,6 MeO MeO	— precedes —
5,6 MDO	

A few things are obvious. Where a thing is located (shown by the number or numbers) has priority over what a thing is (the substituent or substituents). This same locating and identifying code will be used for the benzyl group on the 1-position, but with some extensions which will be explained below.

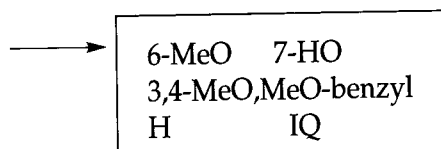
There is, of course, a fourth allowable substituent. This is H (a hydrogen atom), but it is automatically assumed to be on every numbered position not carrying one of the three given oxygenated examples. It is generally accepted, in the creation of a name to represent a chemical structure, that if there is no substituent specified on the aromatic ring the substituent is hydrogen, and is not entered. The presentation of the entry

5,6	MeO HO	— without this exclusion, would have been
5,6,7,8	MeO HO H H	

What about substituents that are groups other than HO, MeO or MDO (and of course the unsubstituted H)? Homologues of MeO such as ethoxy and benzyloxy ( $\text{EtO}$ ,  $\text{BzO}$ ), alkyl groups such as methyl, phenyl, halides, carboxy or substituted carboxy groups, esters of phenols,

nitrogen-containing groups such as nitro or amino derivatives, thio compounds, all are regularly encountered as substituents of isoquinolines in the chemical literature. And since almost all of them are products of synthesis rather than plant products, they are ignored in this compilation. There is an occasional exception, like an O-acetyl derivative that appears to have been isolated from some natural source.

There are plant alkaloids known that can, within the plants' environment, undergo extensive oxidation. In the aporphine group, a compound such as Norcorydine can go to the quinone, all four rings completely aromatic and a carbonyl at the 7-position where the hydroxy group once was. This is the base Pancoridine. So a quinonic carbonyl can appear in the aromatic ring. But its origin was a hydroxy group. So, for all practical purposes, we are staying with the three substituents mentioned above (other than hydrogen). The substituents that are on the benzene ring are listed on the first line in the box at the upper left corner of each compound's entry, in the sequence that corresponds to the number or numbers at the top of the page.



### (3) THE 1-POSITION

The third "letter" of this alphabet is the substituent that is found at the 1-position of the isoquinoline ring. This is the first involvement of the pyridine ring position of the isoquinoline system, so a number of new factors must be considered. There are always two substituents at this position but, depending on the degree of aromaticity of this ring, one of them might be meaningless. And, as there are two substituents, there must be a rule that ranks them. If they are different, the heavier will precede the lighter. This lighter one will be a hydrogen or a methyl group (abbreviated Me). And occasionally there will be a substituent that embraces both substituents as a single thing. And again, as above, there will be occasions where the unnamed substituent is simply hydrogen, and is not mentioned.

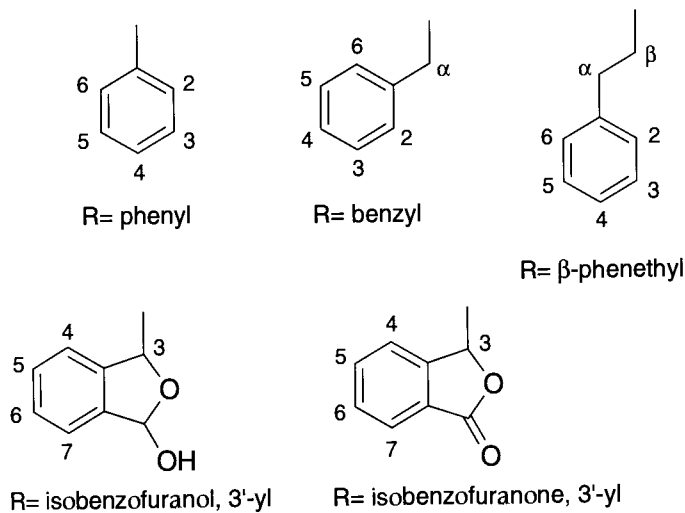
Here is the sequence that will be used, listed by what the substituents really are, and by how they will be entered.



Heavier substituent at the 1-position:	Lighter substituent at the 1-position:	Appearance of this third chemical letter:
H	H	H
Me	H	Me
Me	Me	Me,Me
OH	H	OH or (=O)
OH	Me	OH,Me
R	H	R
R	Me	R,Me
R	HO	R,HO

In those cases where there are two different substituents, this carbon atom becomes chiral. Most natural products have optical activity, but in many plant analyses, the optical rotation is not reported and probably not measured. In the literature there is no way to distinguish between an unknown rotation and a racemate. In these cases, all plant sources for a given isoquinoline have been commingled without regard to the reported optical activity, unless it is known.

The "R" that is mentioned above is one of five aromatic systems, and these are usually substituted themselves. These aromatic systems and their numbering are ranked as shown below:



The priorities for both the numbering and the substituents follow the same patterns established for the first and second chemical letters.

Numbering priority:

none	2	2,3	2,3,4	2,3,4,5	2,3,4,5,6
	3	2,4	2,3,5	2,3,4,6	
	4	2,5	2,3,6	2,3,5,6	
		2,6	2,4,5		
		3,4	2,4,6		
		3,5	3,4,5		

And once the numbers have been decided upon, then the substituent is chosen from the following sequence:

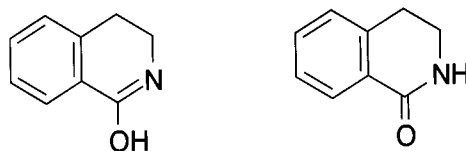
HO  
MeO  
MDO

Again, there are many known compounds that have phenyl, benzyl or phenethyl rings at the 1-position with substitutions other than these three (and the understood and unstated hydrogen atom of course). And, as with the 5,6,7,8 substitution story, most of these are synthetic products and are not part of this book. The few unusual substitutions that are known to be in compounds from natural sources, such as the formyl (CHO) and the carboxyl group (CO<sub>2</sub>H), will be included. The rule of organization is: a group bonded with a carbon atom has priority over a group bonded with an oxygen atom.

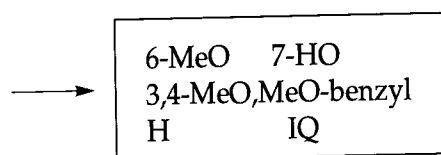
Occasionally there is a carbon or an oxygen substituent found on the alpha-carbon atom of the benzyl group. This is taken into account in the alphabetization. These substituents have the following priority:

Mono-substituted	Di-substituted
Me (methyl)	Me,Me (dimethyl)
HO (hydroxy)	Me,HO (methyl, hydroxy)
AcO (acetoxy)	= CH <sub>2</sub> (methenyl)
MeO (methoxy)	= O (oxo) or (keto)
NH <sub>2</sub> (amino)	

The presence of a carbonyl at the 1-position introduces an ambiguity. In most cases, the structure of the 1-keto product can be redrawn as a 1-hydroxy tautomer with the inclusion of a double bond in the piperidine ring to balance the equation. When this situation occurs, the compound will be entered as the keto tautomer.



This third letter of the atomic alphabet, the 1-position, is entered on the second line in the box found at the upper left corner of each entry.



#### (4) THE 2-POSITION

The fourth "letter" in this chemical alphabet is the substituent at the 2-position, the nitrogen atom, of the isoquinoline ring. The primary substituents found here are the hydrogen and methyl groups, and they are arranged by increasing number:

H	
Me	
Me (+)	
Me,Me(+)	
CHO	(formyl)
CO <sub>2</sub> H	(carboxy)
Ac (COCH <sub>3</sub> )	(acetyl)
CONH <sub>2</sub>	(carbamoyl, or urea)
CO <sub>2</sub> Me	(carbomethoxy)
CO <sub>2</sub> Et	(carboethoxy)

An "H" as the fourth letter does not necessarily mean that there is a hydrogen at this position. It is an indicator of the absence of any substitution on the nitrogen. This, as with the absence or presence of a (+) charge at that position in the methylated examples, reflects the aromaticity of the pyridine ring. This is discussed below in section (5). There are also found, occasionally, amide functions on this nitrogen atom.

Oxidation at this position is frequently found. Hydroxylamines and N-oxides are entered either as footnotes to their non-oxygenated

counterparts or as entries in their own right. There are about a dozen plant isoquinolines that have benzyl substituents on the nitrogen atom. They are included in this collection.

This fourth letter of the atomic alphabet is found at the left side of the third line in the box at the upper left corner of each entry.

6-MeO	7-HO
3,4-MeO,	MeO-benzyl
H	IQ

↑

#### (5) HYDROGENATION

The fifth letter of the chemical alphabet is the simple statement of the degree of hydrogenation of the pyridine ring, and the three codes are ranked in the order of increased aromaticity.

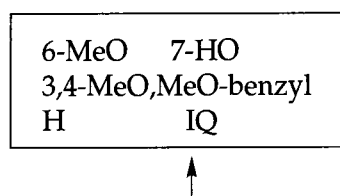
THIQ	tetrahydroisoquinoline
DHIQ	dihydroisoquinoline
IQ	isoquinoline

THIQ is 1,2,3,4-tetrahydroisoquinoline. Both double bonds in the pyridine ring are hydrogenated. If the fourth letter is an "H," there is indeed a hydrogen on the nitrogen. If there are methyl groups there, a single methyl will be without a charge, but two methyls will require a (+) charge.

DHIQ is specifically 3,4-dihydroisoquinoline. If the fourth letter is an "H," there is no substitution on the nitrogen, even though there will be an H written on the third line on the left side. If there is a methyl group indicated, there must be a (+) associated with it. There is an occasional natural dihydroisoquinoline in which the hydrogenation is at the 1,2-positions and the unsaturation is at the 3,4-positions. These have been entered as a footnote under the THIQ compound as 3,4-ene.

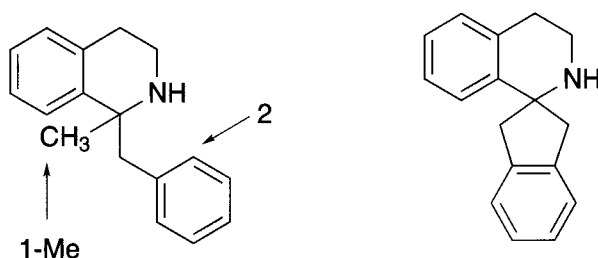
IQ is the completely aromatic compound. Again, in this case, if the 4th letter is indicated as an H, there is no substituent on that nitrogen position and if there is a methyl there, it must have a (+) on it.

This last letter is noted as a THIQ, DHIQ or IQ on the right-hand side of the third line in the box at the upper-left corner of the compound's entry.



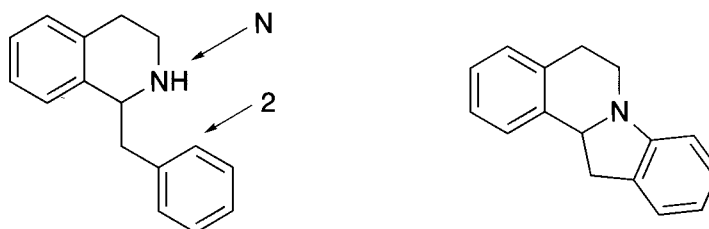
#### THE ORTHO ATTACK

One of the little appreciated but totally fascinating properties shared by perhaps a dozen of the classes of four-ring isoquinolines is that most of them can be visualized as resulting from an "ortho attack," from the 2- or 6-hydrogen atom of the 1-substituent (usually a benzyl group) to some specifically identified position of the isoquinoline ring. These conversions may certainly have biosynthetic reality. But they have a great deal more importance for this book in that they allow a simple and foolproof way of organizing the compounds in text. To locate the target compound under which the four-ring material will be found, simply mentally note the 1-benzylisoquinoline that constitutes its chemical skeleton. The bond forming the fourth ring can be identified as going from an ortho-position of the benzyl to some numbered atom on the isoquinoline. Below they are illustrated and identified as to the alkaloidal class name. One must keep in mind that the benzyl ring has two ortho hydrogens. If it is not symmetrically substituted, the normal numbering priority sequence is used, and that will dictate whether the ortho hydrogen employed in the attack is a 2- or a 6-hydrogen. The examples below show ortho (2,X) attacks. It should be understood that the substitution pattern on the benzyl ring could require that they be called ortho (6,X) attacks. The ortho attacks will be indicated in each section in a separate box from the first. Thus, the first box in each section is the parent compound, and any additional boxes will be modifications, such as an ortho attack, an N-oxide, or other changes.

**Spirobenzylisoquinolines**

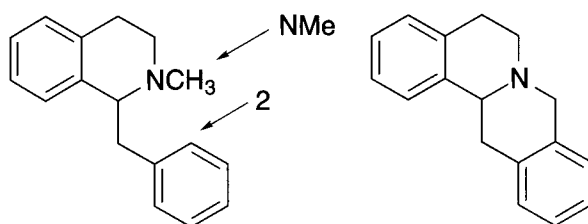
The ortho (2,1-Me) attack

This family is classified in this collection as an ortho-attack on a 1,1-disubstituted tetrahydroisoquinoline where there is a methyl, or some other group (an ortho (2,1-XX) attack).

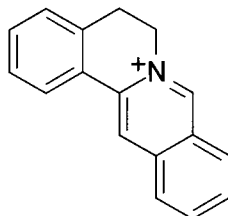
**Dibenzopyrrocolines**

The ortho (2,N) attack

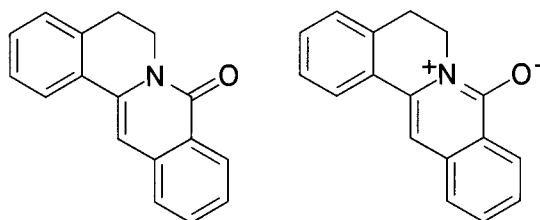
Here the hypothetical 2,N (or 2,2) attack produces a five-membered ring. The tetracyclic product is treated here as an isoquinoline, but it can also be seen as a disubstituted dihydroindole. The usual chemical classification is that of a substituted pyrrocoline, the name for the heterocycle that is the middle two rings of this system.

**Protoberberines (Berberines) and Protopines**

The ortho (2,N-Me) attack



with ring C aromatic

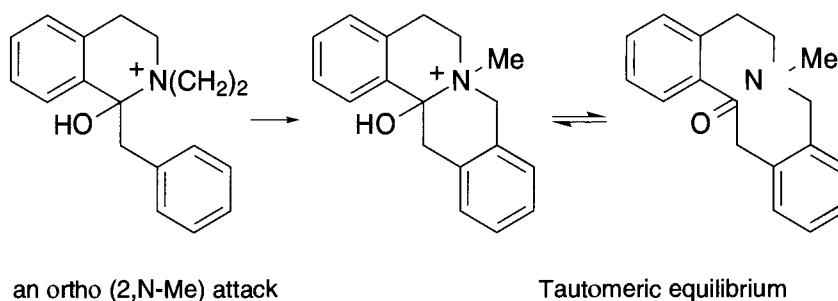


The N-methyl oxo and oxy forms

This is one of the more common ortho attacks, and gives rise to the protoberberines and, with a minor substitution change, the protopines. I have always assumed that the protoberberines were the saturated precursor alkaloids (proto- meaning early or source) which upon aromatization gave the berberines with an aromatic ring "C." It now looks as if the entire group is often simply called the protoberberines. In the four-ring protoberberine with the ring "C" aromatized, the hydroxylation of the carbon atom that was the original N-methyl group leads to

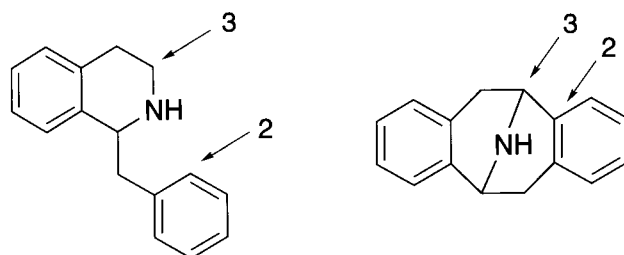
a group of compounds called 8-oxy (or 8-oxo) berberines. This tautomeric interconversion is shown above.

If there is a hydroxy group as well as a benzyl group on the 1-position and there are two N-methyls in the THIQ ring (the quaternary salt), another family can be explored through this 2,N-Me attack. These alkaloids are of the protopine class, but to understand their structures little tautomeric manipulation is needed.



A tautomer is a bit of structural sophistication. One can move the electrons around, without moving any of the atoms, and some end up with quite a different looking thing. Which is it? It's a bit like the problem with the duality of the photon. It is a particle and it is a wave, both. It pretty much depends on how you look at it. The middle structure, with an  $O^-$  and an  $N^+$ , should be rather soluble in water. It is an ionic doubly charged molecule, after all. But the structure on the right is a ketone and an amine, and would probably be lipophilic, and wouldn't dissolve in water. Is it water soluble? Hard to use that as a way of telling the structure because just the act of putting it in water might shift the electrons towards the ionic configuration. As they say in quantum mechanics, you can't observe anything without changing it in some way. These compounds will be portrayed in the 4-ring structure with the  $O^-$  shown as a hydroxy group in the structural index.



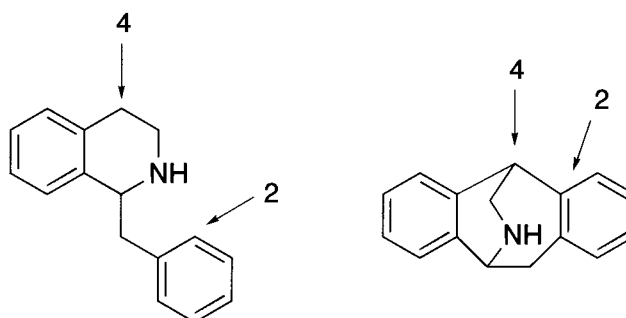
**Pavines**

The ortho (2,3) attack

The pavine family, created by the ortho-3 attack, has an unusual property not shared by any other isoquinoline group. The pavine can be viewed in either of two ways, left to right, or right to left. This is best seen in the above structural diagram on the right. View the left-hand benzene ring as the aromatic ring of the THIQ, and then go to the first carbon atom at the 4 o'clock position. The nitrogen bond in the center demarks the second ring of the isoquinoline, with the 1-position being the point between these two locations, at the bottom. The carbon bond out to the right of this point shows the benzyl group.

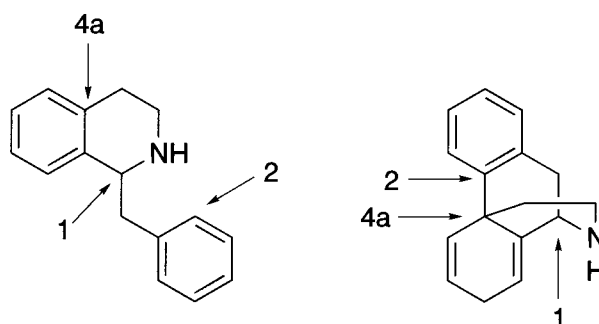
Now view the right-hand benzene ring as the aromatic ring of the isoquinoline, and then go to the carbon atom at the 10 o'clock position. The nitrogen bond in the center demarks the second ring of the isoquinoline; the point above is the 1-position, and the carbon bond out to the left is the benzyl group.

Thus any pavine with different substituents on the two benzene rings could result from an ortho (2,3) attack of either of two different isoquinolines. These items are entered both ways in this book. And in the case of pavines here, and the isopavines below, if there is a methyl group on the nitrogen, it will be represented by the abbreviation Me instead of CH<sub>3</sub>.

**Isopavines**

The ortho (2,4) attack

Unlike the pavines, the unusual internal N-bridged heterocycle of the isopavines admits to an isoquinoline classification in just one direction.

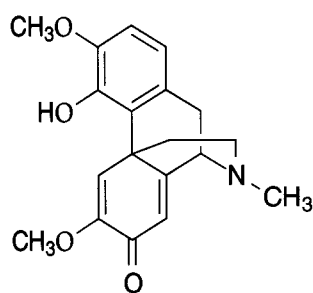
**Morphanans**

The ortho (2,4a) attack

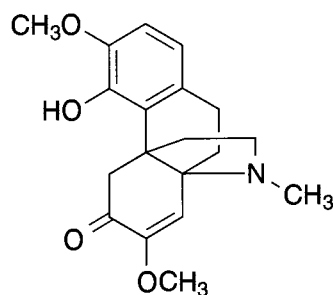
This ortho-4a attack, forming the carbon skeleton of the morphine molecule, is one that is not easily visualized by non-chemists. It requires an out-of-plane manipulation to bring the benzyl group into conjunction with the ring-juncture 4a carbon atom. The 1-benzylisoquinoline is shown in its conventional form on the left. To picture the attack, mentally take hold of the benzyl group and bring it back,

out of the plane of the paper, to where the 2-position is pointing directly at the 4a-position. This is the only one of the ortho attacks that is superficially not an oxidation. The consequence is that the aromatic resonance status of the benzenoid ring of the THIQ is permanently lost. The location of the residual double bonds and other electrons depends totally on the substitution pattern of the isoquinoline aromatic ring. Once the attack has been achieved, the plant world makes many further chemical steps, leading to a host of alkaloids related to thebaine and morphine, both of which contain an additional heterocyclic furan ring. They lie beyond the scope of this compilation. An unnatural, but fascinating compound is the (+) isomer of the product of this attack with a 4-methoxybenzyl on the 1-position, a methyl on the nitrogen, and hydrogenation of the residual benzene ring of the parent isoquinoline. This product is the broadly abused antitussive, dextromethorphan, or DXM.

Another family of alkaloids, the Hasubanans, are often lumped together with the Morphinans because of a superficially similar morphology. As an illustration:

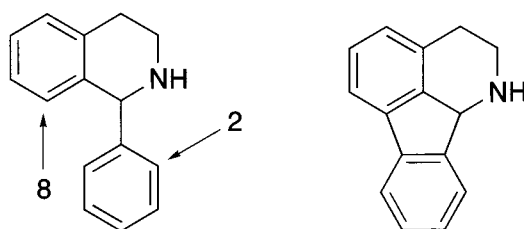


Sinoacutine (a Morphinan)



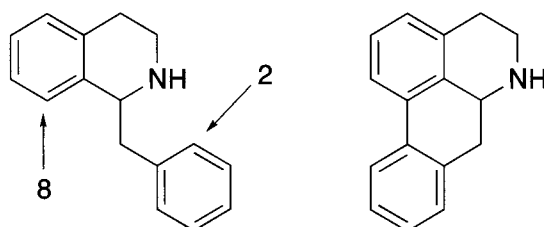
Cepharamine (a Hasubanan)

They are actually indoles, not isoquinolines, and so they are not included in this listing.

**Azafluoranthenes**

The ortho (2,8) attack (with a 1-phenyl)

Although most ring-substituents on the 1-position of the natural tetrahydroisoquinolines are substituted benzyl groups or isobenzofuranones, occasionally a phenyl group is observed, bound directly to the isoquinoline ring. An ortho (2,8) attack leads directly to the indino[1,2,3-ij]isoquinolines, known commonly as the azafluoranthenes.

**Aporphines**

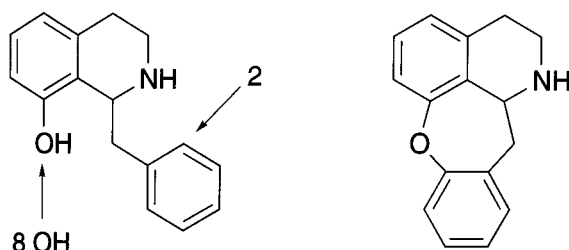
The ortho (2,8) attack (with a 1-benzyl)

This family is viewed as an ortho-attack on the 8-position of the isoquinoline ring. This produces a four-ring system known as an aporphine.

Well over a hundred years ago it was discovered that morphine, when treated with a strong acid, gave rise to the compound apomorphine, an aporphine. It is now known that the lower of the two aromatic rings of apomorphine is the result of the rearomatization of the benzyl group, which was compromised by the ortho-4a attack men-

tioned above. But at the time it was thought to be a simple conversion, and for a long while the structure of apomorphine was thought to represent the skeleton of morphine itself.

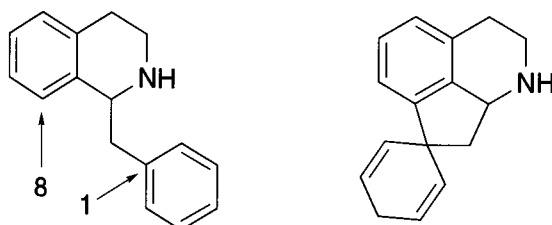
### Cularines



The ortho (2,8-OH) attack

Here is the generation of a 7-membered oxygen-containing heterocycle.

### Proaporphines

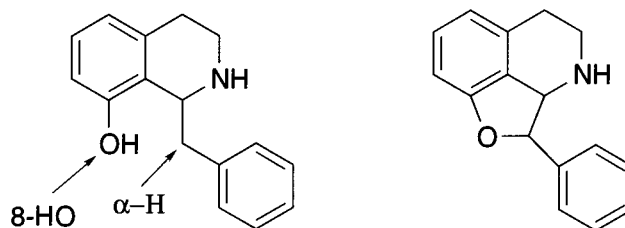


The (1,8) attack

This is a 1,1-spirobenzyl intermediate to what is quite likely the entire family of the aporphines. The "pro" part of the name suggests that this is a biosynthetic precursor to these alkaloids. Very often there is a keto function at the 4-position of the benzyl group (equivalent to a hydroxyl group on the original benzyl), to facilitate the spiro loss of aromaticity needed to achieve this type of coupling. This is directly analogous to the (2,4a) attacks needed to get into the morphinans, where

a ketonic presentation of an aromatic hydroxyl group permits the bonding to occur.

### 5-phenylfurano[2,3,4-ij]isoquinolines



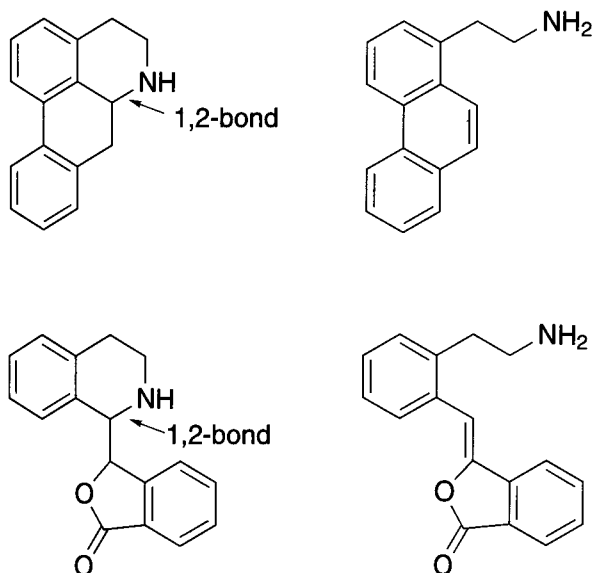
The  $\alpha$ ,8-HO attack

There are several reports of tetrahydroisoquinolines with a fused furan ring that could be argued (for the sake of the classification used in this collection) as an oxidative attack by the  $\alpha$ -hydrogen of the 1-benzyl onto the 8-HO substituent, in a manner similar to the formation of a seven-membered ether ring seen in the cularines. It can also be seen as a similar oxidative attack from an  $\alpha$ -hydroxy group (a commonly encountered benzyl substituent) on the 8-hydrogen position. The first of these two mechanisms (illustrated above) is used in this collection.

### THE SECOISOQUINOLINES

The prefix "seco" is an unusual term occasionally encountered in the literature of natural products. Just as the term "ortho-attack" indicates the generation of a new ring, the term "seco" indicates the destruction of a ring. A secoisoquinoline is formed from a 1-substituted tetrahydroisoquinoline by the loss of the 1,2-bond. Transferring a hydrogen atom from the  $\alpha$ -carbon to the nitrogen, and reshuffling the electrons, results in the formation of a new double bond.

## Phenethylamines



1,2 seco bond loss

In an appendix to the book "TIHKAL: The Continuation" there were listed a number of the phenethylamines known to be in the cactus family. These were all of classical simplicity with the phenyl ring substituted with one or more hydroxys and methoxys, and an occasional methylenedioxy group. There was also an occasional hydroxy group on the beta position of the chain, and on the nitrogen atom there were zero, one, or two methyl groups. There was no mention made of a subclass of phenethylamines which are intimately associated with the isoquinolines. The chemical term "seco" is a clever device for maintaining a structural relationship between two chemicals after having, magically, removed a structural bond. Illustrated here is an aporphine with the electrons from that 1,2-bond having been rearranged into the middle ring. It would probably be chemically classified as an aminoethyl-substituted phenanthrene, rather than a phenethylamine which had been fused (2,3a) with a naphthalene, but in this book it will be listed in the section describing the parent 1-benzyl-tetrahydroisoquinoline, modified with an ortho attack if appropriate, followed by a 1,2-seco bond removal.

With the simpler 1-benzyl derivatives (those which have not undergone any ortho-attack), the removal of the 1,2-bond usually produces a 2-styryl substituted phenethylamine. Again, this would be located in the entry that described the parent isoquinoline.

The second illustration above is a phthalide THIQ, and these phenethylamines are sometimes referred to as secophthalide-isoquinolines. Here, the oxygen atom of the original isofuranone ring is substituted on the newly formed double bond. This structure can easily open up to the corresponding ketonic carboxylic acid. These seco-modifications of the attacked isoquinoline (first example, illustrated with an aporphine) and the simpler 1-substituted isoquinolines (second example, as illustrated by the isobenzofuranone) are the only ones included in this book. The standard phenethylamines that are commonly found in cacti, compounds which are not from these seco-mechanisms, have been tabulated in TIHKAL and will not be repeated here.

There have been many compounds excluded from this compilation, but to give examples would increase the mass of this collection without any useful information. They are, in a general hand-waving sense, those compounds not explicitly allowed in the above inclusion criteria.

To all rules, there are always exceptions. These have been made to allow unexpected natural isoquinolines that just happen to present unexpected substituents that nature for some reason chose to contribute to this collection. Mention has been made of an occasional carbonyl group disrupting the aromaticity of the benzene ring (this is the basis of the quinonic isoquinolines). The nitrogen atom (position 2) occasionally displays an amide group (these have been entered at the fourth letter of the structural alphabet). Several natural compounds demand a hydroxyl or methoxyl function at the isoquinoline 3- or 4-positions. When this occurs, the compound is listed as a footnote under the parent structure.

More difficult to generalize, are the isoquinolines with new rings resulting from biosynthetic attacks from here to there that are excluded from this study. In a broad, inclusive statement the line has again been drawn to exclude everything that has not been included above.

Originally it was intended to list every plant in which these natural isoquinolines are found, documented with a literature reference. The project became unmanageable in that some of the more common alkaloids have been found in literally hundreds of plants. So, in some cases, if there are many species from one Genus, the plant listing will be condensed to mention the particular Genus, the family, plus a literature reference; e.g., *Corydalis* spp. (Papaveraceae) jnp 51, 262 '88. This way the broadness of distribution is established. Also, there are



sections in the structural index where there is a compound that has one or more synonyms. In some instances, synonyms of what are supposed to be the "same" compound have been given different lists of plants. So, it could be that different names are given to represent different optical isomers, we don't know. But in most cases the differentiation was respected, the lists of plants to a given name were kept separate within a given section.

For much of the plant information we are most grateful for being allowed access to the NAPRALERT (sm) database at the University of Illinois at Chicago, and would highly recommend the use of their services if more detailed information is wanted. In particular, we appreciate the help of Douglas Trainor there. Also, we'd like to give great thanks to Jim Bauml, the Senior Biologist at the Arboretum of Los Angeles County, for helping to resolve many plant name and family issues, Amy Rasmussen for her superb proofreading skills, and Frani Halperin for her artwork on the cover of this book.

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O-Methylseverzine	241
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$\beta$ -N-Methylstylopinium quat	313
N-Methyltetrahydrocolumbamine	151
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N-Methylthalbaicaline	380
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N-Methylthalidaldine	408
O-Methylthalisopavine	214
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Norpredicentrine	73
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Oxonantenine	231
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13-Oxoprotopine	331
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Oxopurpureine	404
Oxoputerine	273
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Oxyberberine	299
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N-Oxyguatterine	410
Oxyhydrastinine	333
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Pseudolaudanine	73
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Stephanine	260
Stepharanine	136
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Stepharinosine	187

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Telikovine	174
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Tetradehydroscoulerine	117
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Tetrahydrocolumbamine	141
Tetrahydrocoptisine	307
Tetrahydrocorysamine	315
Tetrahydrojatrorrhizine	74
Tetrahydropalmatine	207
Tetrahydropalmatrubine	191
Tetrahydropapaverine	205
Tetrahydroprotoberberine	40
Tetrahydropseudoberberine	300
Tetrahydrosinacutine	120
Tetrahydrostephabine	438

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Thailandine	261
Thaipetaline	378
Thalactamine	408
Thalbaicalidine	380
Thalbaicaline	379
Thalflavine	425
Thallicmidine	149
Thallicmidine methine	152
Thallicmidine N-oxide	150
Thallicmine	417
Thallicminine	418
Thalicsimidine	402
Thalicipureine	403
Thalichuberine	228
Thalichuberine N-oxide	229
Thalictricavine	304
Thalictricine	294
Thalictrimine	327
Thalictrine	129
Thalictrisine	294
Thalictuberine	228
Thalidastine	291
Thalidicine	138
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Thalisopynine	401
Thaliphendine	291
Thalphenine	159
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Trichoguattine	252
Triclisine	166

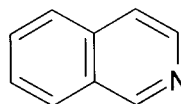
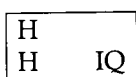
Tridictyophylline	438
3,10,11-Trihydroxy-1,2-methylenedioxy-noraporphine	382
Trilobinine	158
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Tritopine	191
Tuduranine	178
Tuliferoline	396
Turcamine	354
Turcomanidine	188
Turcomanine	109
Uberine	46
Umbellatin	297
Ushinsunine	254
Ushinsunine $\beta$ -N-oxide	254
Uthongine	283
Uvariopsamine	187
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Uvariopsine	268
Vaillantine	51
Velucryptine	106
Veronamine	399
Viguine	245
Weberidine	44
Weberine	456
Wilsonirine	139
Worenine	316
Xanthaline	219
Xanthopetaline	292
Xanthoplanine	198
Xanthopuccine	296
Xyloguyelline	384
Xylopine	266
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Xylopinine N-oxide	213
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Yenhusomine	234

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Yuziphine	355
Zanoxylene	185
Zanthoxyphylline	184
Zenkerine	105
Zijinlongine	449
Zippelianine	428
Zizyphusine	51

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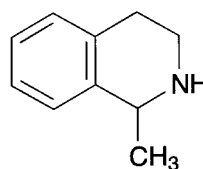
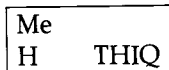
UNSUBSTITUTED ISOQUINOLINES

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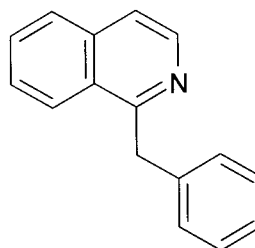
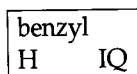
**Isoquinoline**  
**Leucoline**  
**2-Benzazine**

*Cistanche salsa* (Orobanchaceae) yh 8, 522 '88  
*Nicotiana tabacum* cv (Solanaceae) abc 41, 377 '77  
*Papaver somniferum* (Papaveraceae) abf 21, 201 '84  
*Spigelia anthelmia* (Loganiaceae) pm 52, 378 '86



**1-Methyl-1,2,3,4-tetrahydroisoquinoline**

*Pachycereus weberi* (Cactaceae) ac 57, 109 '85



**1-Benzylisoquinoline**

*Thalictrum* spp. (Ranunculaceae) yfz 10, 72 '90

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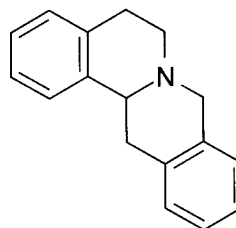


benzyl
Me    THIQ

**8,8a-Secoberbine**  
Not a natural product.  
syn 9, 887 '92

with a (2,N-Me) attack:
-------------------------

**Tetrahydropprotoberberine**  
**Berbine**



*Berberis beaniana* (Berberidaceae) tl 25, 951 '84  
*Fumaria officinalis* (Papaveraceae) abs 4

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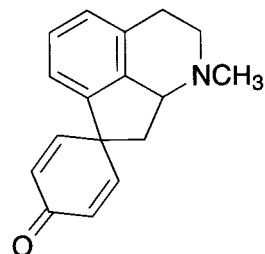
4-HO-benzyl
Me    THIQ

Compound unknown

with a (1,8) attack:
----------------------

**Proaporphine**

*Phoebe formosana* (Lauraceae) pptp 27, 65 '93



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 5-SUBSTITUTED ISOQUINOLINES
 

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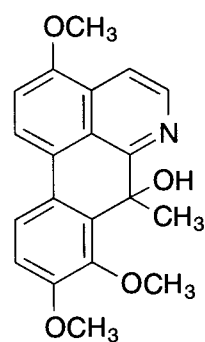
5-MeO	
2,3-MeO, MeO- $\alpha$ , $\alpha$ -Me, HO-benzyl	
H	IQ

Compound unknown

with a (6,8) attack:

**Sinomendine**

*Sinomenium acutum* (Menispermaceae)  
jnp 57, 1033 '94

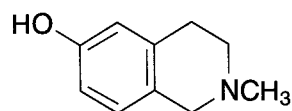



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 6-SUBSTITUTED ISOQUINOLINES
 

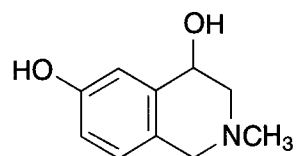
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6-HO	
H	
Me	THIQ

**Longimammosine**

*Dolichothele longimamma* (Cactaceae) joc 41, 319 '76

with a 4-hydroxy group:

**4,6-Dihydroxy-2-methyltetrahydroisoquinoline**

*Theobroma cacao* (Sterculiaceae) llyd 41, 130 '78

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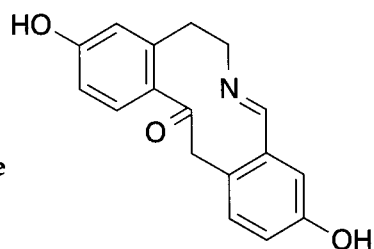
6-HO
4-HO-benzyl, HO
Me      THIQ

Compound unknown

with a (2,N-Me) attack and loss of hydrogen:
---

**5,6-Dihydroconstrictosine**

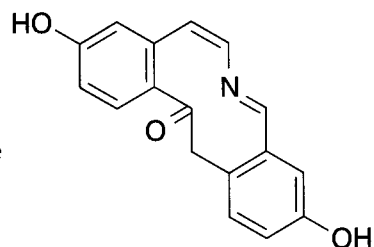
*Aristolochia constricta* (Aristolochiaceae)  
aa 13, 737 '83



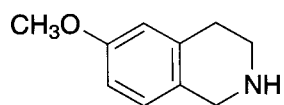
with a 3,4-ene:
-----------------

**Constrictosine**

*Aristolochia constricta* (Aristolochiaceae)  
aa 13, 737 '83



6-MeO
H
H      THIQ

**Longimammatine**

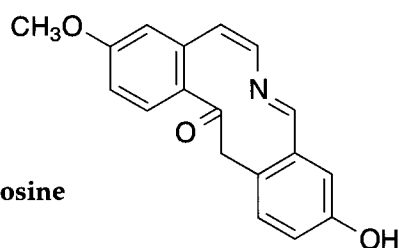
*Dolichothele longimamma* (Cactaceae) joc 41, 319 '76  
*Dolichothele uberiformis* (Cactaceae) joc 41, 319 '76

6-MeO  
4-HO-benzyl, HO  
Me THIQ

Not a natural product.  
tet 37, 3175 '81

with a (2,N-Me) attack,  
loss of hydrogen,  
and a 3,4-ene:

**3-O-Methylconstrictosine**



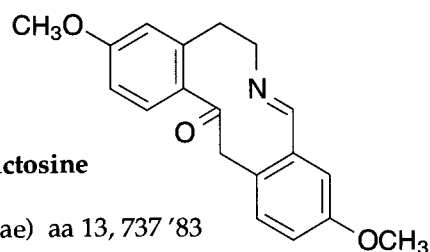
*Aristolochia constricta* (Aristolochiaceae) aa 13, 737 '83

6-MeO  
4-MeO-benzyl, HO  
Me THIQ

Not a natural product.  
joc 44, 3730 '79

with a (2,N-Me) attack  
and loss of hydrogen:

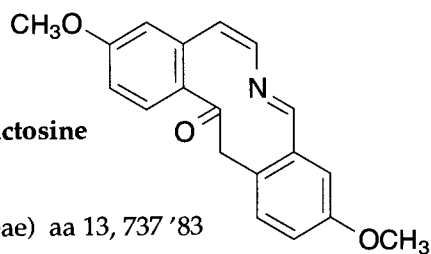
**5,6-Dihydro-3,5-di-O-methylconstrictosine**



*Aristolochia constricta* (Aristolochiaceae) aa 13, 737 '83

and a 3,4-ene:

**3,5-Di-O-methylconstrictosine**



*Aristolochia constricta* (Aristolochiaceae) aa 13, 737 '83

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 7-SUBSTITUTED ISOQUINOLINES
 

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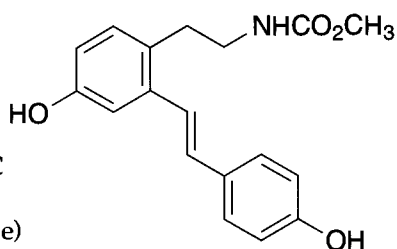
7-HO
4-HO-benzyl
H      THIQ

Compound unknown

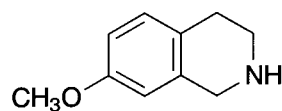
with a 1,2 seco, with an N-carbomethoxy:
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**Gusanlung C**

*Arcangelisia gusanlung* (Menispermaceae)  
phy 39, 439 '95



7-MeO
H
H      THIQ

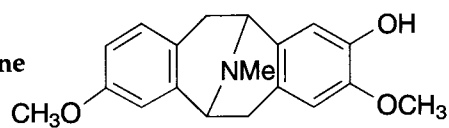
**Weberidine**

*Pachycereus weberi* (Cactaceae) ac 57, 109 '85

7-MeO
3,4-MeO,HO-benzyl
Me      THIQ

Compound unknown

with a (6,3) attack:
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**2,9-Dimethoxy-3-hydroxypavinane**

*Argemone munita* (Papaveraceae) joc 38, 3701 '73

also under: 6,7 MeO HO R Me THIQ  
R= 4-MeO-benzyl (2,3) attack

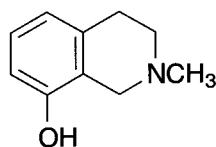
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**8-SUBSTITUTED ISOQUINOLINES**

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8-HO
H
Me      THIQ

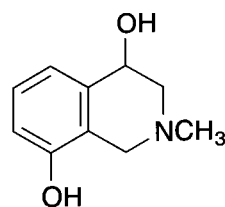
**Longimammidine**

*Dolichothele longimamma* (Cactaceae) joc 41, 319 '76

*Dolichothele uberiformis* (Cactaceae) llyd 40, 173 '77

*Theobroma cacao* (Sterculiaceae) llyd 41, 130 '78

with a 4-hydroxy group:
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**Longimammamine**

*Dolichothele longimamma* (Cactaceae) joc 41, 319 '76

*Dolichothele uberiformis* (Cactaceae) llyd 40, 173 '77

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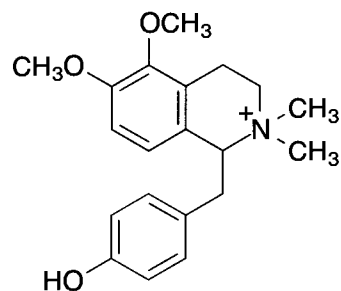
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**5,6-DISUBSTITUTED ISOQUINOLINES**


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5-MeO	6-MeO
4-HO-benzyl	
Me,Me+	THIQ



**5,6-Dimethoxy-2,2-dimethyl-1-(4-hydroxybenzyl)-1,2,3,4-THIQ quat**

*Desmos yunnanensis* (Annonaceae) tcyk 12, 1 '00

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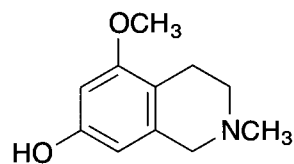
---

**5,7-DISUBSTITUTED ISOQUINOLINES**


---

5-MeO	7-HO
H	
Me	THIQ

**Uberine**



*Dolichothele uberiformis* (Cactaceae) jnp 40, 173 '77

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**5,8-DISUBSTITUTED ISOQUINOLINES**


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None found in plants

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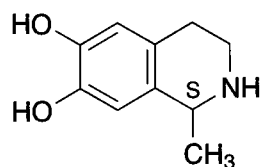
---

**6,7-DIHYDROXYSUBSTITUTED ISOQUINOLINES**


---

6-HO	7-HO
Me	
H	THIQ

**Salsolinol**  
**Sal**



*Aconitum carmichaeli* (Ranunculaceae) yx 17, 792 '82

*Musa paradisiaca* (Musaceae) jafc 24, 189 '76

*Theobroma cacao* (Sterculiaceae) jafc 24, 900 '76

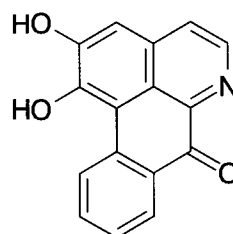
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6-HO	7-HO
$\alpha$ -keto-benzyl	
H	IQ

Compound unknown

with a (2,8) attack:

**Liriodendronine**



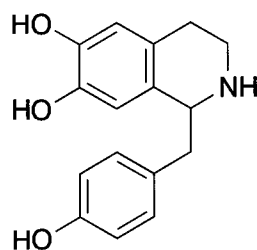
*Liriodendron tulipifera* (Magnoliaceae)

phy 16, 2015 '77

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6-HO	7-HO
4-HO-benzyl	
H	THIQ

**Higenamine**  
**Norcoclaurine**  
**Demethylcoclaurine**



*Aconitum carmichaelii* (Ranunculaceae) kjp 29, 129 '98

*Aconitum japonicum* (Ranunculaceae) jnp 44, 53 '81

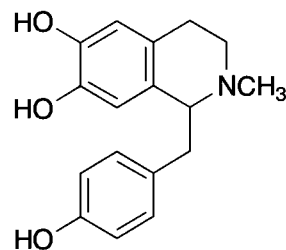
*Aconitum koreanum* (Ranunculaceae) kjp 29, 129 '98

*Aconitum kusnezoffii* (Ranunculaceae) kjp 29, 129 '98



*Aconitum napiforme* (Ranunculaceae) kjp 29, 129 '98  
*Annona reticulata* (Annonaceae) tl 28, 1251 '87  
*Annona squamosa* (Annonaceae) jnp 44, 53 '81  
*Asiasarum heterotropoides* (Aristolochiaceae) cpb 26, 2284 '78  
*Asiasarum sieboldii* (Aristolochiaceae) cpj 44, 211 '92  
*Euodia rutaecarpa* (Rutaceae) book 1  
*Gnetum parvifolium* (Gnetaceae) jnp 62, 1025 '99  
*Nelumbo nucifera* (Nymphaeaceae) cpb 18, 2564 '70

6-HO	7-HO
4-HO-benzyl	
Me	THIQ

**(dl)-N-Methylhigenamine**

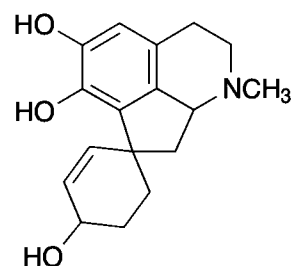
*Gnetum parvifolium* (Gnetaceae) jnp 62, 1025 '99

the N-oxide:

**(-)-N-Methylhigenamine N-Oxide**

*Gnetum parvifolium* (Gnetaceae) jnp 62, 1025 '99

with a (1,8) attack,  
and reduction of a double bond and of  
the carbonyl group in the benzyl ring:

**Discolorine**

*Croton discolor* (Euphorbiaceae) rlq 1, 140 '70

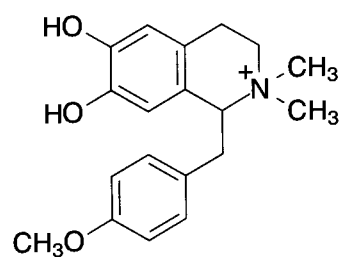
*Croton plumieri* (Euphorbiaceae) rlq 1, 140 '70

the glucoside at the 7-OH position:

**N-Methylhigenamine, 7-O-β-D-glucopyranoside**

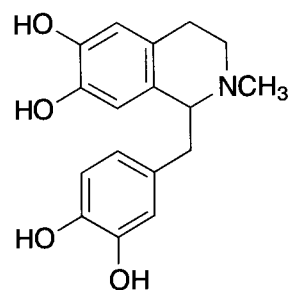
*Phellodendron amurense* (Rutaceae) phy 35, 209 '94

6-HO	7-HO
4-MeO-benzyl	
Me,Me+	THIQ

**Luxandrine**

*Pseudoxandra sclerocarpa* (Annonaceae) phy 25, 2693 '86

6-HO	7-HO
3,4-HO,HO-benzyl	
Me	THIQ

**Laudanosoline**

*Papaver somniferum* (Papaveraceae) book 4

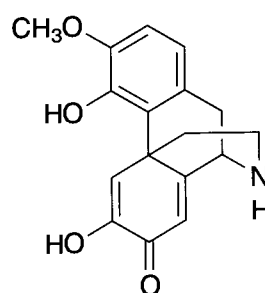
6-HO	7-HO
3,4-HO,MeO-benzyl	
H	THIQ

**Compound unknown**

with a (2,4a) attack:

**4,6-Dihydroxy-3-methoxymorphinandien-7-one**

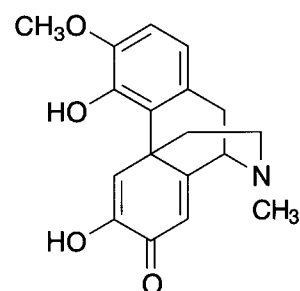
*Croton bonplandianus* (Euphorbiaceae)  
phy 20, 683 '81



6-HO	7-HO
3,4-HO,MeO-benzyl	
Me	THIQ

Compound unknown

with a (2,4a) attack:

**Mocrispatine***Monodora crispata* (Annonaceae) aua 17, 105 '81

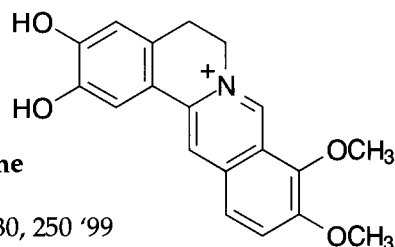
6-HO	7-HO
3,4-MeO,MeO-benzyl	
Me	THIQ

**Tetrahydroprotopapaverine**

Not a natural product.

jcspt 2, 1696 '80

with a (2,N-Me) attack and aromatization of the c-ring:

**Demethyleneberberine***Stephania venosa* (Menispermaceae) zh 30, 250 '99*Thalictrum javanicum* (Ranunculaceae) jnp 46, 454 '83

with a (6,8) attack:

**Lastourvilline***Artabotrys lastourvillensis* (Annonaceae)

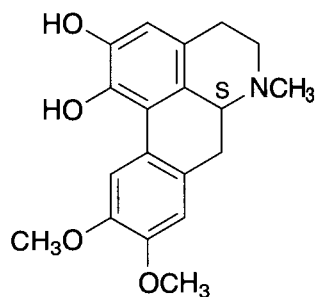
jnp 48, 460 '85

*Fumaria indica* (Papaveraceae)

phy 31, 2869 '92

*Glaucium leiocarpum* (Papaveraceae)

pm 65, 492 '99



6-HO	7-HO
3,4-MeO,MeO-benzyl	
Me,Me+	THIQ

Compound unknown

with a (2,8) attack:

**Zizyphusine***Nandina domestica* (Berberidaceae)

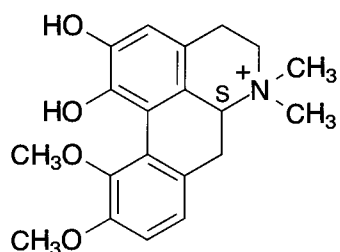
nmt 50, 427 '96

*Ziziphus fructus* (Rhamnaceae)

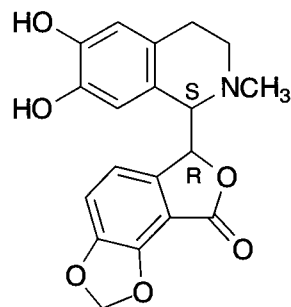
apr 10, 208 '87

*Ziziphus jujuba* (Rhamnaceae)

apr 12, 263 '89

*Ziziphus spinosa* (Rhamnaceae) kjp 16, 44 '85

6-HO	7-HO
6',7'-MDO-isobenzofuranone, 3'-yl	
Me	THIQ

**Papraine***Fumaria indica* (Papaveraceae) het 29, 1091 '89

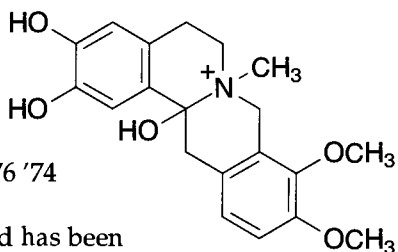
6-HO	7-HO
3,4-MeO,MeO-benzyl, HO	
Me,Me+	THIQ

Compound unknown

with a (2,N-Me) attack:

**Vaillantine***Fumaria vaillantii* (Papaveraceae) kps 476 '74

The assigned structure of this compound has been challenged: jnp 45, 241 '82

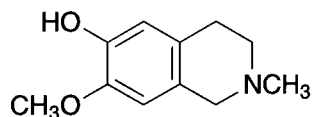


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**6,7-HO-MeO-ISOQUINOLINES**


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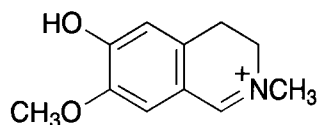
6-HO	7-MeO
H	
Me	THIQ

**Isocorypalline**

*Berberis oblonga* (Berberidaceae) cnc 11, 563 '75  
*Corydalis stricta* (Papaveraceae) kps 19, 461 '83  
*Stephania cepharantha* (Menispermaceae) nm 52, 541 '98

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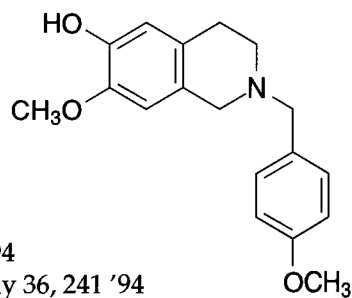
6-HO	7-MeO
H	
Me+	DHIQ

**Isopyncnarrhine**

*Popowia pisocarpa* (Annonaceae) jnp 49, 1028 '86

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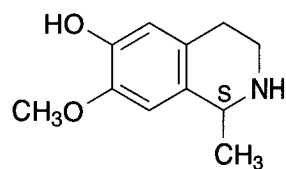
6-HO	7-MeO
H	
4-MeO-benzyl	THIQ

**Isosendaverine**

*Corydalis* sp. (Papaveraceae) phy 36, 241 '94  
*Ceratocarpus heterocarpus* (Papaveraceae) phy 36, 241 '94

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6-HO	7-MeO
Me	
H	THIQ

**Salsoline**

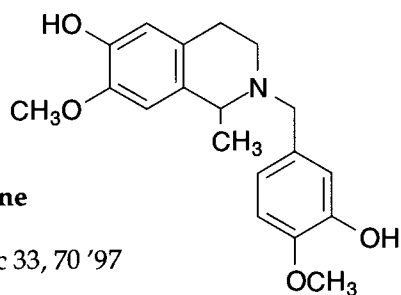
*Alangium lamarckii* (Alangiaceae) pms 5 '80  
*Corispermum leptopyrum* (Chenopodiaceae) app 34, 421 '77  
*Desmodium tiliaefolium* (Fabaceae) phy 12, 193 '73

*Echinocereus merkerii* (Cactaceae) jps 58, 1413 '69  
*Genista purgens* (Fabaceae) nr  
*Pachycereus pecten-aboriginum* (Cactaceae) aps 15, 127 '78  
*Salsola arbuscula* (Chenopodiaceae) ber 67, 878 '34  
*Salsola kali* (Chenopodiaceae) book 6  
*Salsola pestifera* (Chenopodiaceae) iant 2, 86 '85  
*Salsola richteri* (Chenopodiaceae) rr 16, 86 '80

6-HO	7-MeO
Me	
3,4-HO,MeO-benzyl	THIQ

**Nummularine**

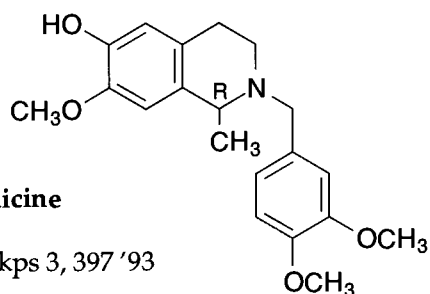
*Berberis nummularia* (Berberidaceae) cnc 33, 70 '97



6-HO	7-MeO
Me	
3,4-MeO,MeO-benzyl	THIQ

**Bernumicine**

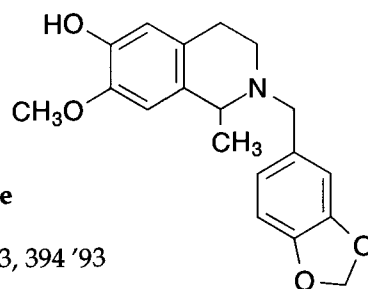
*Berberis nummularia* (Berberidaceae) kps 3, 397 '93



6-HO	7-MeO
Me	
3,4-MDO-benzyl	THIQ

**Bernumine**

*Berberis nummularia* (Berberidaceae) kps 3, 394 '93

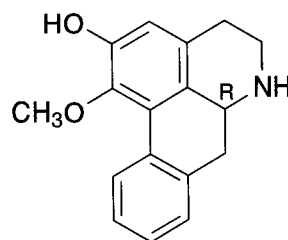


6-HO	7-MeO
benzyl	
H	THIQ

Not a natural product.  
joc 49, 581 '84

with a (2,8) attack:

**(-)-Asimilobine**



*Anaxagorea* spp. (Annonaceae) pm 41, 48 '81  
*Annona cherimolia* (Annonaceae) jccs 44, 313 '97  
*Annona squamosa* (Annonaceae) cpj 46, 439 '94  
*Annona* spp. (Annonaceae) fit 65, 87 '94  
*Anomianthus* spp. (Annonaceae) bs&e 26, 139 '98  
*Artabotrys* spp. (Annonaceae) jbas 15, 59 '91  
*Asimina* spp. (Annonaceae) yz 85, 77 '65  
*Cananga odorata* (Annonaceae) jccs 46, 607 '99  
*Cardiopetalum* spp. (Annonaceae) pm 57, 581 '91  
*Cymbopetalum* spp. (Annonaceae) pm 50, 517 '84  
*Desmos* spp. (Annonaceae) jnp 45, 617 '82  
*Disepalum* spp. (Annonaceae) phy 29, 3845 '90  
*Fissistigma* spp. (Annonaceae) abs 3  
*Glossocalyx* spp. (Monimiaceae) jnp 48, 833 '85  
*Goniothalamus* spp. (Annonaceae) abs 3  
*Guatteria* spp. (Annonaceae) jnp 46, 335 '83  
*Hexalobus* spp. (Annonaceae) lac 1982, 1623 '82  
*Laurelia philippiana* (Monimiaceae) phy 21, 773 '82  
*Liriodendron* spp. (Magnoliaceae) cnc 13, 602 '77  
*Magnolia* spp. (Magnoliaceae) phy 23, 188 '84  
*Meiogyne* spp. (Annonaceae) phy 26, 537 '87  
*Melodorum* spp. (Annonaceae) ajc 24, 2187 '71  
*Monocyclanthus* spp. (Annonaceae) jnp 54, 1331 '91  
*Nelumbo* spp. (Nymphaeaceae) jnp 50, 773 '87  
*Ocotea* spp. (Lauraceae) fes 30, 479 '75  
*Oncodostigma* spp. (Annonaceae) pmp 20, 251 '86  
*Orophea* spp. (Annonaceae) bs&e 27, 111 '99  
*Phoebe* spp. (Lauraceae) jccs 40, 209 '93  
*Polyalthia suberosa* (Annonaceae) jbas 16, 99 '92  
*Popowia* spp. (Annonaceae) jnp 49, 1028 '86  
*Rollinia* spp. (Annonaceae) jnp 49, 1028 '86

*Siparuna* spp. (Monimiaceae) pm 59, 100 '93  
*Stephania* spp. (Menispermaceae) yhhp 21, 223 '86  
*Talauma* spp. (Magnoliaceae) apf 43, 189 '85  
*Uvaria* spp. (Annonaceae) nm 51, 272 '97  
*Xylopia* spp. (Annonaceae) pmp 16, 253 '82  
*Ziziphus* spp. (Rhamnaceae) pjsr 30, 81 '78

glucoside at the 6-HO position:

**(-)-Asimilobine-2-O- $\beta$ -D-glucoside**

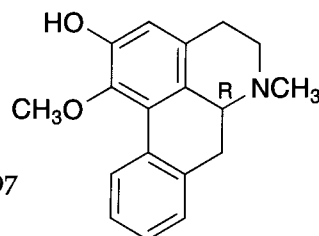
*Stephania pierrei* (Menispermaceae) jnp 56, 1468 '93

6-HO	7-MeO
benzyl	
Me	THIQ

Not a natural product.  
 jhc 4, 417 '67

with a (2,8) attack:

**N-Methylasimilobine  
 O-Nornuciferine**



*Annona cherimolia* (Annonaceae) jccs 44, 313 '97  
*Annona* spp. (Annonaceae) phy 49, 2015 '98  
*Colubrina* spp. (Rhamnaceae) pm 27, 304 '75  
*Duguetia* spp. (Annonaceae) jnp 50, 664 '87  
*Monocyclanthus* spp. (Annonaceae) jnp 54, 1331 '91  
*Nelumbo* spp. (Nymphaeaceae) jps 66, 1627 '77  
*Oxymitra* spp. (Annonaceae) phy 30, 1265 '91  
*Papaver* spp. (Papaveraceae) dsa 7, 93 '83  
*Stephania cepharantha* (Menispermaceae) jnp 63, 477 '00  
*Xylopia* spp. (Annonaceae) jnp 44, 551 '81  
*Ziziphus* spp. (Rhamnaceae) apr 12, 263 '89

glucoside at the 6-HO position:

**(-)-N-Methylasimilobine-2-O- $\beta$ -D-glucopyranoside**

*Stephania cepharantha* (Menispermaceae) jnp 63, 477 '00



rhamnoside at the 6-HO position:

**Floripavidine**  
**N-Methylasimilobine-2-O- $\alpha$ -L-rhamnopyranoside**

*Papaver armeniacum* (Papaveraceae) dsa 7, 93 '83

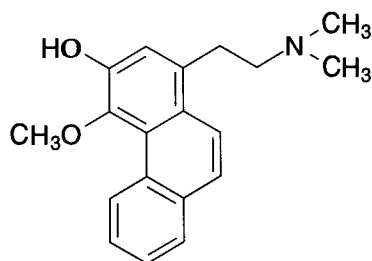
*Papaver fugax* (Papaveraceae) dsa 7, 93 '83

*Papaver tauricolum* (Papaveraceae) dsa 7, 93 '83

6-HO	7-MeO
benzyl	
Me, Me+	THIQ

Compound unknown

with a (2,8) attack  
and a 1,2 seco:



**Argentinine**

*Annona montana* (Annonaceae)

pns 3, 63 '79

*Aristolochia argentina* (Aristolochiaceae) aaqa 60, 309 '72

*Enantia chlorantha* (Annonaceae) pm 9, 296 '75

*Guatteria discolor* (Annonaceae) jnp 47, 353 '84

*Guatteria foliosa* (Annonaceae) jnp 57, 890 '94

*Guatteria goudotiana* (Annonaceae) phy 30, 2781 '91

*Monocyclanthus vignei* (Annonaceae) jnp 57, 1033 '94

*Phaeanthus vietnamensis* (Annonaceae) fit 62, 315 '91

*Popowia pisocarpa* (Annonaceae) jnp 49, 1028 '86

the N-oxide:

**Argentinine N-Oxide**

*Monocyclanthus vignei* (Annonaceae) jnp 57, 1033 '94

6-HO	7-MeO
benzyl	
Ac	THIQ

Compound unknown

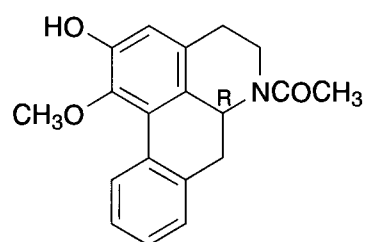
with a (2,8) attack:

**(-)-N-Acetylasimilobine***Liriodendron tulipifera* (Magnoliaceae)

phy 15, 547 '76

*Zanthoxylum simulans* (Rutaceae)

phy 36, 237 '94



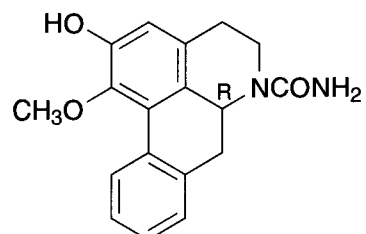
6-HO	7-MeO
benzyl	
CONH <sub>2</sub>	THIQ

Compound unknown

with a (2,8) attack:

**N-Carbamoylasimilobine***Hexalobus crispiflorus* (Annonaceae)

jnp 46, 761 '83

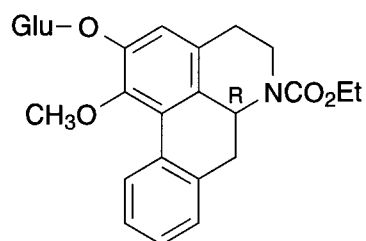


6-HO	7-MeO
benzyl	
CO <sub>2</sub> Et	THIQ

Compound unknown

with a (2,8) attack,  
glucoside at the 6-HO position:**Kamaline***Stephania venosa* (Menispermaceae)

phy 36, 1053 '94



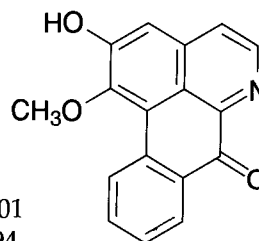
6-HO	7-MeO
$\alpha$ -keto-benzyl	
H	IQ

Compound unknown

with a (2,8) attack:

**Oxoasimilobine**  
**7-Oxodehydroasimilobine**

*Annona cherimolia* (Annonaceae) jccs 46, 77 '99  
*Dasymaschalon rostratum* (Annonaceae) zzz 26, 39 '01  
*Monocyclanthus vignei* (Annonaceae) jnp 57, 1033 '94

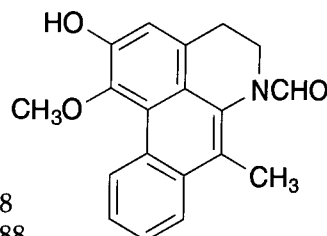


6-HO	7-MeO
$\alpha$ -Me-benzyl	
CHO	THIQ

Compound unknown

with a (2,8) attack  
and an  $\alpha,1$ -ene:**Duguespexine**

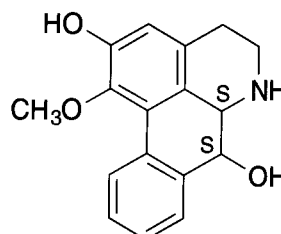
*Duguetia spixiana* (Annonaceae) jnp 51, 389 '88  
*Guatteria sagotiana* (Annonaceae) jnp 51, 389 '88



6-HO	7-MeO
$\alpha$ -HO-benzyl	
H	THIQ

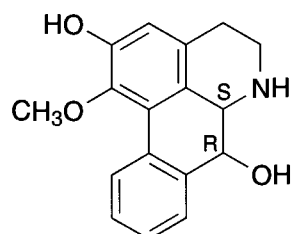
Compound unknown

with a (2,8) attack:

**Norpachyconfine***Duguetia spixiana* (Annonaceae) jnp 50, 664 '87

**(-)-Anaxagoreine**

*Anaxagorea* sp. (Annonaceae) pm 41, 48 '81  
*Cananga odorata* (Annonaceae) jccs 46, 607 '99



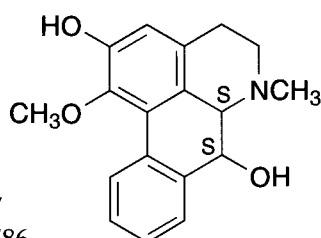
6-HO	7-MeO
$\alpha$ -HO-benzyl	
Me	THIQ

Compound unknown

with a (2,8) attack:

**Pachyconfine**

*Duguetia spixiana* (Annonaceae) jnp 50, 664 '87  
*Guatteria sagotiana* (Annonaceae) jnp 49, 1078 '86  
*Pachypodanthium confine* (Annonaceae) apf 35, 65 '77



the N-oxide:

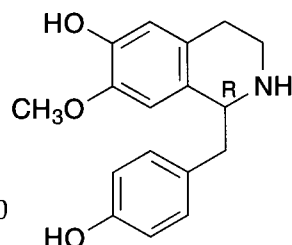
**N-Oxypachyconfine**  
**Pachyconfine N-oxide**

*Duguetia spixiana* (Annonaceae) jnp 50, 664 '87

6-HO	7-MeO
4-HO-benzyl	
H	THIQ

**(+)-Isococlaurine**

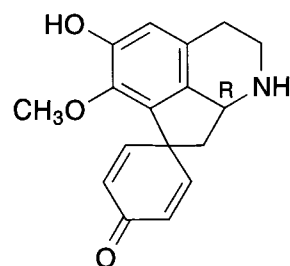
*Desmos yunnanensis* (Annonaceae) tcyk 12, 1 '00



with a (1,8) attack:

### Crotonosine

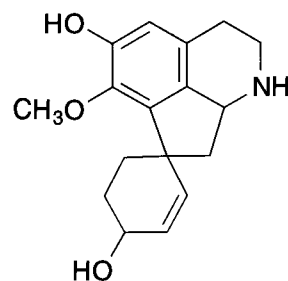
*Croton cumingii* (Euphorbiaceae) llyd 32, 1 '69  
*Croton discolor* (Euphorbiaceae) llyd 32, 1 '69  
*Croton linearis* (Euphorbiaceae) llyd 32, 1 '69  
*Croton plumieri* (Euphorbiaceae) phy 8, 777 '69



and reduction of the 2,3 double bond  
 and of the carbonyl group  
 in the benzyl ring:

### Jaculadine

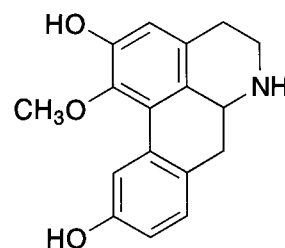
*Croton discolor* (Euphorbiaceae) rlq 1, 140 '70  
*Croton plumieri* (Euphorbiaceae) rlq 1, 140 '70



with a (2,8) attack:

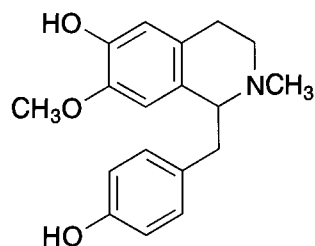
### Apocrotonosine

*Croton* sp. (Euphorbiaceae) jnp 38, 275 '75



6-HO 7-MeO  
 4-HO-benzyl  
 Me THIQ

### N-Methylisococlaurine



(+)-isomer:

*Desmos yunnanensis* (Annonaceae) tcyyk 12, 1 '00

(-)-isomer:

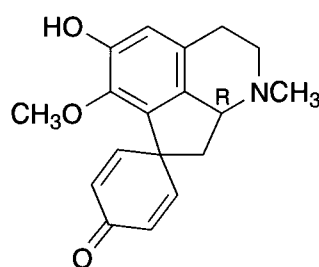
*Phoebe minutiflora* (Lauraceae) cpj 49, 217 '97

isomer not specified:

*Nelumbo nucifera* (Nymphaeaceae) phy 12, 699 '73

with a (1,8) attack:

**N-Methylcrotonosine**



(-)-isomer:

*Croton discolor* (Euphorbiaceae) rlq 1, 140 '70

*Croton plumieri* (Euphorbiaceae) phy 8, 777 '69

*Meconopsis cambrica* (Papaveraceae) jnp 44, 67 '81

*Papaver triniaefolium* (Papaveraceae) pm 63, 575 '97

isomer not specified:

*Anomianthus dulcis* (Annonaceae) bs&e 26, 139 '98

*Croton cumingii* (Euphorbiaceae) llyd 32, 1 '69

*Croton linearis* (Euphorbiaceae) llyd 32, 1 '69

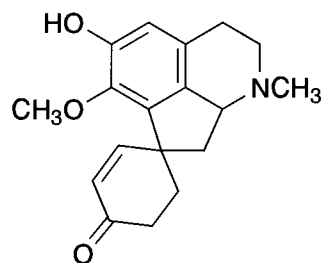
*Oropheia hexandra* (Annonaceae) bs&e 27, 111 '99

*Papaver fugax* (Papaveraceae) pm 41, 105 '81

The earliest isolation of this base from the *Croton* species (pcs 261 '64) was a mixture of alkaloids that was given the name Homolinearisine. Subsequent purification showed it to be N-Methylcrotonosine (jcs 1676 '66).

and reduction of a double bond in the benzyl ring:

**Linearisine**

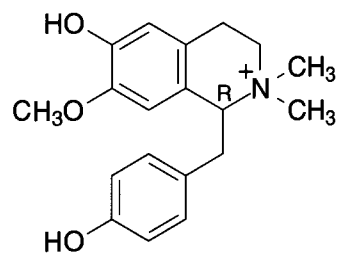


*Croton discolor* (Euphorbiaceae) rlq 1, 140 '70

*Croton linearis* (Euphorbiaceae) llyd 32, 1 '69

*Croton plumieri* (Euphorbiaceae) phy 8, 777 '69

6-HO	7-MeO
4-HO-benzyl	
Me, Me+	THIQ

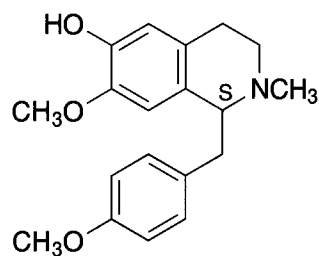
**Lotusine***Nelumbo nucifera* (Nymphaeaceae)

zzz 16, 673 '91

*Tiliacora racemosa* (Menispermaceae)

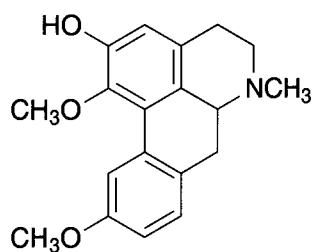
jics 57, 773 '80

6-HO	7-MeO
4-MeO-benzyl	
Me	THIQ

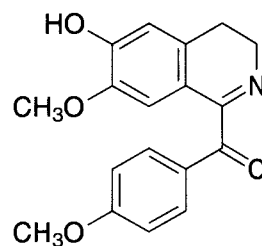
**(+)-Roefractine***Roemeria refracta* (Papaveraceae)

jnp 53, 666 '90

with a (2,8) attack:

**Phoebe base II***Phoebe* sp. (Lauraceae) jnp 38, 275 '75

6-HO	7-MeO
4-MeO- $\alpha$ -keto-benzyl	
H	DHIQ

**Isovelucryptine***Cryptocarya velutinosa* (Lauraceae)

jnp 52, 516 '89

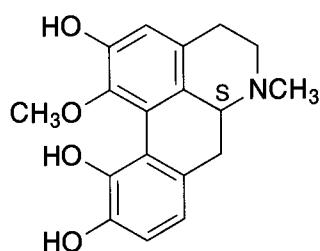
6-HO	7-MeO
3,4-HO,HO-benzyl	
Me	THIQ

Compound unknown

with a (2,8) attack:

**Glaufine**

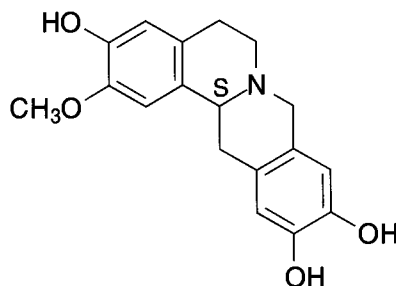
*Glaucium fimbrilligerum* (Papaveraceae)  
kps 4, 493 '83



with a (6,N-Me) attack:

**(-)-Artavenustine**

*Artabotrys venustus* (Annonaceae)  
jnp 49, 602 '86

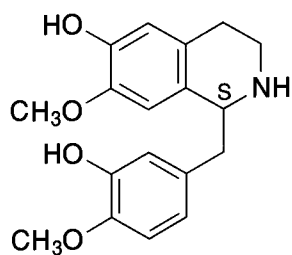


and a glucoside on the 3-HO of the original benzyl group:
--

**Dauricoside**

*Menispermum dauricum* (Menispermaceae) cpb 41, 1866 '93

6-HO	7-MeO
3,4-HO,MeO-benzyl	
H	THIQ

**(+)-Norprotosinomenine**

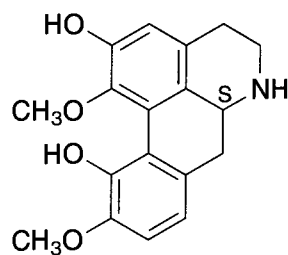
*Erythrina lithosperma* (Fabaceae) ajc 24, 2733 '71



with a (2,8) attack:

**Lindcarpine**

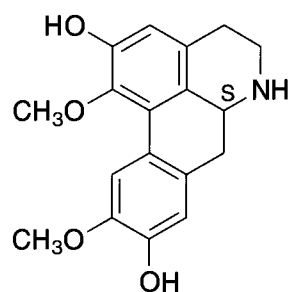
- Hernandia voyronii* (Hernandiaceae) pm 64, 58 '98  
*Illigera pentaphylla* (Hernandiaceae) jnp 48, 835 '85  
*Lindera pipericarpa* (Lauraceae) het 9, 903 '78  
*Lindera reflexa* (Lauraceae) cty 25, 565 '94  
*Litsea acuminata* (Lauraceae) cpj 46, 299 '94  
*Phoebe grandis* (Lauraceae) phy 45, 1543 '97  
*Stephania* sp. (Menispermaceae) jnp 38, 275 '75



with a (6,8) attack:

**Laurolictsine  
Norboldine**

- Cryptocarya longifolia* (Lauraceae) ajc 34, 195 '81  
*Dehaasia kurzii* (Lauraceae) fit 62, 261 '91  
*Illigera pentaphylla* (Hernandiaceae) jnp 48, 835 '85  
*Lindera reflexa* (Lauraceae) cty 25, 565 '94  
*Litsea rotundifolia* (Lauraceae) ryz 8, 324 '00  
*Litsea* spp. (Lauraceae) pm 48, 52 '83  
*Machilus duthei* (Lauraceae) jcp 2, 157 '80  
*Monimia rotundifolia* (Monimiaceae) apf 38, 537 '80  
*Nectandra salicifolia* (Lauraceae) jnp 59, 576 '96  
*Neolitsea aurata* (Lauraceae) jccs 22, 349 '75  
*Neolitsea buisanensis* (Lauraceae) jccs 22, 349 '75  
*Peumus boldus* (Monimiaceae) phy 32, 897 '93  
*Phoebe clemensii* (Lauraceae) jnp 46, 913 '83  
*Phoebe formosana* (Lauraceae) jnp 46, 913 '83  
*Phoebe grandis* (Lauraceae) phy 45, 1543 '97  
*Phoebe minutiflora* (Lauraceae) cpj 49, 217 '97  
*Retanilla ephedra* (Rhamnaceae) rlq 5, 158 '74



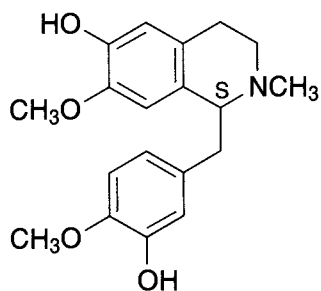
6-HO	7-MeO
3,4-HO,MeO-benzyl	
Me	THIQ

**Protosinomenine***Erythrina lithosperma* (Fabaceae)

ajc 24, 2733 '71

*Litsea glutinosa* (Lauraceae)

jcspt I, 1477 '88

*Polyalthia nitidissima* (Annonaceae) pm 49, 20 '83*Stephania cepharantha* (Menispermaceae) cpb 45, 470 '97

with a (2,N-Me) attack:

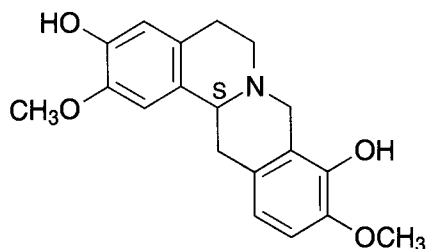
**Isoscoulerine**

(-)-isomer:

*Corydalis ambigua* (Papaveraceae)

daib 45, 2160 '85

isomer not specified:

*Stephania hainanensis* (Menispermaceae) cty 18, 146 '87

with a (2,4a) attack:

the 1,8a trans isomer:

**Sinomenine**  
**Cucoline**  
**Kukoline**
*Stephania cepharantha* (Menispermaceae)

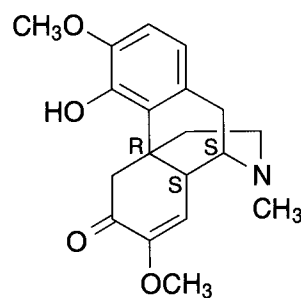
cpb 45, 470 '97

*Stephania epigaea* (Menispermaceae)

nyx 5, 203 '85

*Stephania micrantha* (Menispermaceae)

nyx 7, 13 '87



the 1,8a cis isomer:

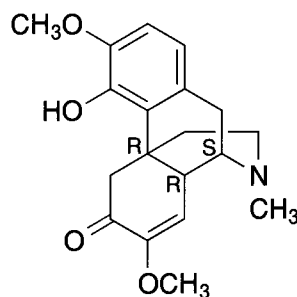
### 14-Episinomenine

*Ocotea brachybotra* (Lauraceae)

fes 32, 767 '77

*Stephania cepharantha* (Menispermaceae)

cpb 45, 470 '97



with a (2,8) attack:

### N-Methylindcarpine Phoebe base

*Dehaasia triandra* (Lauraceae)

tet 52, 6561 '96

*Glaucium paucilobum* (Papaveraceae)

jsiri 10, 229 '99

*Glaucium* spp. (Papaveraceae) jnp 61, 1564 '98

*Illigera pentaphylla* (Hernandiaceae) jnp 48, 835 '85

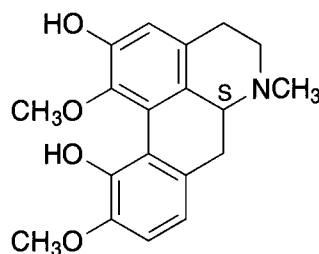
*Litsea cubeba* (Lauraceae) jccs 39, 453 '92

*Magnolia acuminata* (Magnoliaceae) daib 32, 2312 '71

*Menispermum canadense* (Menispermaceae) llyd 34, 292 '71

*Phoebe clemensii* (Lauraceae) jnp 46, 913 '83

*Strychnopsis thouarsii* (Menispermaceae) pm 58, 540 '92

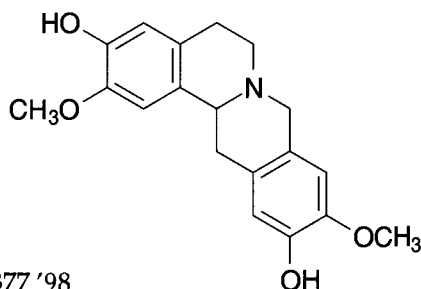


with a (6,N-Me) attack:

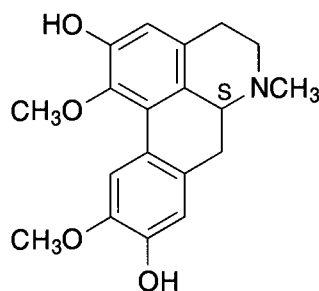
### (S)(-)-Isocoreximine 11-O-Demethyldiscretine

*Toddalia asiatica* (Rutaceae) phy 48, 1377 '98

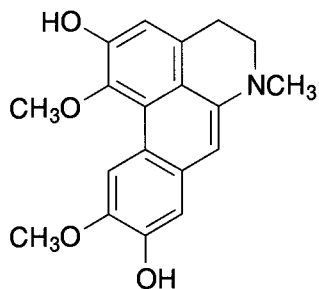
*Xylopiella vieillardii* (Annonaceae) jnp 54, 466 '91



with a (6,8) attack:

**Boldine**

- Actinodaphne* spp. (Lauraceae) ajc 22, 2257 '69  
*Artabotrys lastourvillensis* (Annonaceae) jnp 48, 460 '85  
*Cocculus* spp. (Menispermaceae) jics 56, 1020 '79  
*Dehaasia kurzii* (Lauraceae) fit 58, 430 '87  
*Desmos tiebaghiensis* (Annonaceae) jnp 45, 617 '82  
*Hedycarya angustifolia* (Monimiaceae) het 26, 447 '87  
*Illigera pentaphylla* (Hernandiaceae) jnp 48, 835 '85  
*Laurelia novae-zelandiae* (Monimiaceae) hca 50, 1583 '67  
*Laurus nobilis* (Lauraceae) jnp 45, 560 '82  
*Lindera* spp. (Lauraceae) jnp 48, 160 '85  
*Litsea* spp. (Lauraceae) cpj 46, 299 '94  
*Machilus duthei* (Lauraceae) jcp 2, 157 '80  
*Monimia rotundifolia* (Monimiaceae) apf 38, 537 '80  
*Nectandra grandiflora* (Lauraceae) ijp 31, 189 '93  
*Neolitsea* spp. (Lauraceae) jccs 45, 103 '98  
*Peumus* spp. (Monimiaceae) jc 612, 315 '93  
*Phoebe grandis* (Lauraceae) phy 45, 1543 '97  
*Polyalthia cauliflora* var. *beccarii* (Annonaceae) jnp 47, 504 '84  
*Retanilla ephedra* (Rhamnaceae) rlq 5, 158 '74  
*Sassafras albidum* (Lauraceae) llyd 39, 473a '76  
*Trivalvaria macrophylla* (Annonaceae) jnp 53, 862 '90

and an  $\alpha,1$ -ene:**Dehydroboldine**

- Peumus boldus* (Monimiaceae) jnp 51, 389 '88

6-HO 7-MeO  
3,4-HO,MeO-benzyl  
Me,Me+ THIQ

Compound unknown

with a (2,8) attack:

**N,N-Dimethylindcarpine**

*Aristolochia triangularis* (Aristolochiaceae)

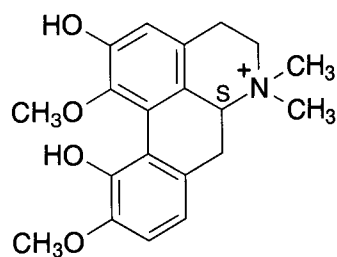
jcps 6, 8 '97

*Caltha leptosepala* (Ranunculaceae)

phy 16, 500 '77

*Coscinium fenestratum* (Menispermaceae) pm 38, 24 '80

*Magnolia* spp. (Magnoliaceae) jnp 38, 275 '75

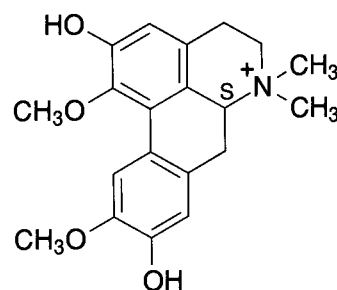


with a (6,8) attack:

**N-Methylboldine  
Boldine methiodide**

*Cocculus* sp. (Menispermaceae)

jnp 46, 761 '83



6-HO 7-MeO  
3,4-HO,MeO-benzyl  
Ac THIQ

Compound unknown

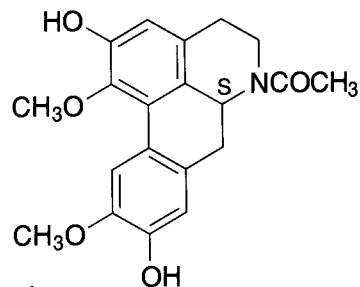
with a (6,8) attack:

**N-Acetyllauroilsine**

*Litsea rotundifolia* (Lauraceae)

ryz 8, 324 '00

*Litsea* sp. (Lauraceae) ajc 22, 2259 '69



6-HO	7-MeO
3,4-MeO,HO-benzyl	
H	THIQ

Not a natural product.  
jcspt I, 1531 '75

with a (2,8) attack:

**(+)-Hernovine**

*Croton linearis* (Euphorbiaceae)

llyd 32, 1 '69

*Croton wilsonii* (Euphorbiaceae)

rlq 1, 140 '70

*Hernandia guianensis* (Hernandiaceae)

pm 50, 20 '84

*Hernandia nymphaeifolia* (Hernandiaceae) pm 63, 154 '97

*Hernandia ovigera* (Hernandiaceae) apf 42, 317 '84

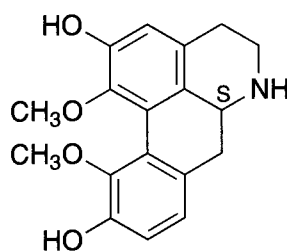
*Illigera luzonensis* (Hernandiaceae) jnp 60, 645 '97

*Illigera parviflora* (Hernandiaceae) cty 22, 393 '91

*Lindera myrrha* (Lauraceae) phy 35, 1363 '94

*Neolitsea variabilissima* (Lauraceae) het 9, 903 '78

*Ocotea teleiandra* (Lauraceae) rlq 23, 18 '92



(The name Hernovine is used as a synonym for Ovigerine. See pg. 306)

with a (6,8) attack:

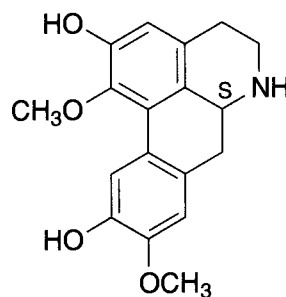
**Laetanine**

*Hernandia voyronii* (Hernandiaceae)

pm 64, 58 '98

*Litsea leata* (Lauraceae) phy 18, 910 '79

*Ocotea teleiandra* (Lauraceae) rlq 23, 18 '92

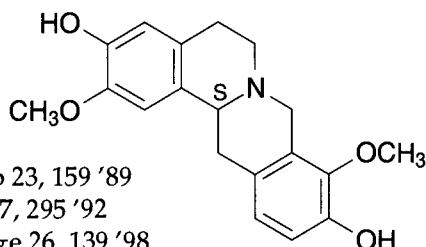


6-HO	7-MeO
3,4-MeO,HO-benzyl	
Me	THIQ

Not a natural product.  
dmd 14, 703 '86

with a (2,N-Me) attack:

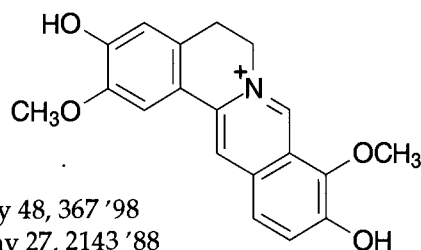
**(S)(-)-Discretamine  
Aequaline**



- Annona cherimolia* (Annonaceae) pmp 23, 159 '89  
*Annona reticulata* (Annonaceae) zzz 17, 295 '92  
*Anomianthus dulcis* (Annonaceae) bs&e 26, 139 '98  
*Artabotrys maingayi* (Annonaceae) jnp 53, 503 '90  
*Artabotrys venustus* (Annonaceae) jnp 49, 602 '86  
*Desmos longiflorus* (Annonaceae) fit 66, 463 '95  
*Desmos tiebaghiensis* (Annonaceae) jnp 45, 617 '82  
*Duguetia calycina* (Annonaceae) pmp 12, 259 '78  
*Fissistigma glaucescens* (Annonaceae) phy 24, 1829 '85  
*Fissistigma oldhamii* (Annonaceae) abs 3  
*Goniothalamus amuyon* (Annonaceae) abs 3  
*Guatteria discolor* (Annonaceae) jnp 47, 353 '84  
*Meiogyne virgata* (Annonaceae) phy 26, 537 '87  
*Nandina domestica* (Berberidaceae) phy 27, 2143 '88  
*Oncodostigma monosperma* (Annonaceae) jnp 52, 273 '89  
*Polyalthia stenopetala* (Annonaceae) phy 29, 3845 '90  
*Rollinia leptopetala* (Annonaceae) pbl 38, 318 '00  
*Saccopetalum prolificum* (Annonaceae) ccl 11, 129 '00  
*Schefferomitra subaequalis* (Annonaceae) joc 42, 3588 '77  
*Stephania intermedia* (Menispermaceae) yhtp 16, 1 '85  
*Stephania succifera* (Menispermaceae) zx 31, 544 '89  
*Uvaria lucida* (Annonaceae) nm 51, 272 '97  
*Xylopi buxifolia* (Annonaceae) jnp 44, 551 '81  
*Xylopi discreta* (Annonaceae) bull 1

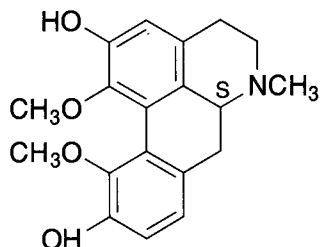
and aromatization of the c-ring:

**Dehydrodiscretamine**



- Fissistigma balansae* (Annonaceae) phy 48, 367 '98  
*Nandina domestica* (Berberidaceae) phy 27, 2143 '88  
*Stephania intermedia* (Menispermaceae) yhtp 16, 1 '85  
*Thalictrum foliolosum* (Ranunculaceae) daib 45, 520 '84  
*Tinospora capillipes* (Menispermaceae) pm 50, 88 '84

with a (2,8) attack:

**N-Methylhernovine***Croton linearis* (Euphorbiaceae)

llyd 32, 1 '69

*Croton wilsonii* (Euphorbiaceae)

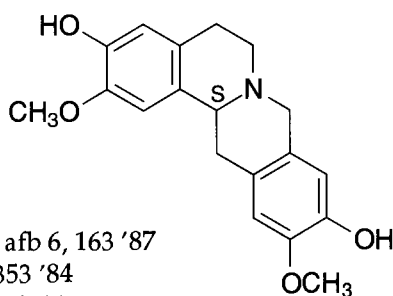
llyd 32, 1 '69

*Hernandia guianensis* (Hernandiaceae)

pm 50, 20 '84

*Hernandia nymphaeifolia* (Hernandiaceae) pm 63, 154 '97*Hernandia peltata* (Hernandiaceae) pm 46, 119 '82*Lindera megaphylla* (Lauraceae) jnp 57, 689 '94*Lindera oldhamii* (Lauraceae) het 9, 903 '78*Neolitsea variabilima* (Lauraceae) het 9, 903 '78

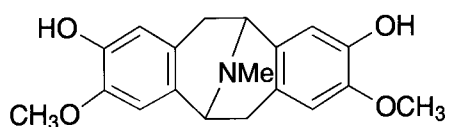
with a (6,N-Me) attack:

**10-O-Demethyldiscretine***Artabotrys venustus* (Annonaceae)

jnp 49, 602 '86

*Caryomene olivascens* (Menispermaceae) afb 6, 163 '87*Guatteria discolor* (Annonaceae) jnp 47, 353 '84*Xylopia vieillardii* (Annonaceae) jnp 54, 466 '91

with a (6,3) attack:

**Bisnorargemonine****Dinorargemonine****Rotundine***Argemone* spp. (Papaveraceae) jnp 46, 293 '83*Chasmanthera dependens* (Menispermaceae) pm 49, 17 '83*Cocculus laurifolius* (Menispermaceae) tet 40, 1591 '84*Corydalis decumbens* (Papaveraceae) jca 669 1/2, 225 '94*Cryptocarya longifolia* (Lauraceae) jnp 46, 293 '83*Eschscholzia* spp. (Papaveraceae) jnp 46, 293 '83



*Fumaria bastardii* (Papaveraceae) nps 4, 257 '98

*Thalictrum dasycarpum* (Ranunculaceae) jnp 46, 293 '83

also under: 6,7 MeO HO R Me THIQ

R= 3,4-HO,MeO-benzyl (6,3) attack

(The name Rotundine has been used for two unrelated alkaloids; the one in this section, and one which is a synonym for Tetrahydropalmatine. The literature shows that (-)-Rotundine (Tetrahydropalmatine) comes from *Stephania* sp., whereas this Rotundine comes from *Argemone* sp.)

with a (6,8) attack:

### Liriotulipiferine

*Artabotrys lastourvillensis* (Annonaceae)

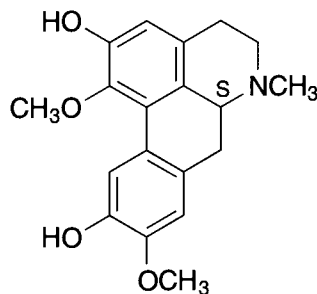
jnp 48, 460 '85

*Liriodendron tulipifera* (Magnoliaceae)

jnp 42, 325 '79

*Litsea cubeba* (Lauraceae) jca 667, 322 '94

*Strychnopsis thouarsii* (Menispermaceae) pm 58, 540 '92



6-HO 7-MeO  
3,4-MeO,HO- $\alpha$ -Me-benzyl  
Me THIQ

Compound unknown

with a (2,N-Me) attack:

### Corydalidzine

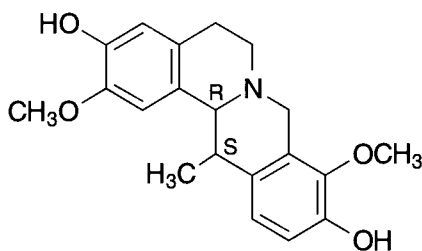
*Corydalis caucasica* (Papaveraceae)

ijcd 27, 161 '89

*Corydalis koidzumiana* (Papaveraceae) cpb 23, 313 '75

*Corydalis nobilis* (Papaveraceae) cccc 54, 2009 '89

*Corydalis solida* ssp. *brachyloba* (Papaveraceae) jcsp 13, 63 '91



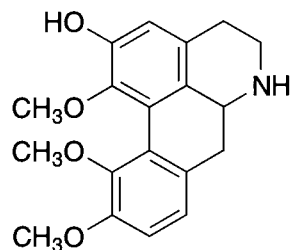
6-HO	7-MeO
3,4-MeO,MeO-benzyl	
H	THIQ

Not a natural product.  
sh 17, 49 '86

with a (2,8) attack:

**10-O-Methylhernovine**

*Croton wilsonii* (Euphorbiaceae) rlq 1, 140 '70



with a (6,8) attack:

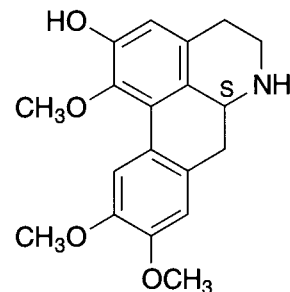
**Norpredicentrine**  
**9-O-Methylaurolitsine**  
**9-O-Methylnorboldine**

*Guatteria scandens* (Annonaceae)

jnp 46, 335 '83

*Hernandia voyronii* (Hernandiaceae)

pm 64, 58 '98

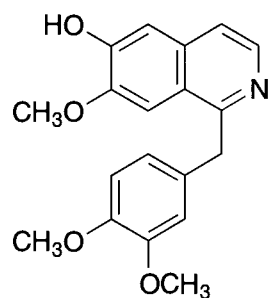


6-HO	7-MeO
3,4-MeO,MeO-benzyl	
H	IQ

**Isopacodine**

*Papaver somniferum* var. *noordster* (Papaveraceae)

jcspt I, 1531 '75



6-HO	7-MeO
3,4-MeO,MeO-benzyl	
Me	THIQ

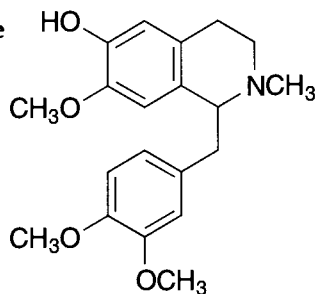
**(+)-Pseudolaudanine**

*Arctomecon merriami* (Papaveraceae)

bse 18, 45 '90

*Roemeria refracta* (Papaveraceae)

jnp 53, 666 '90



and a (+)-trans 4-hydroxy group:

### Roemecarine

*Roemeria carica* (Papaveraceae)

het 24, 1227 '86

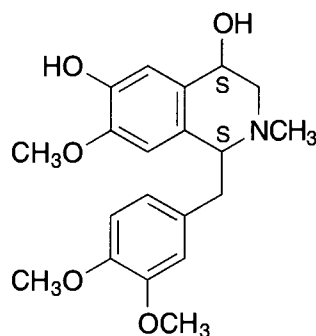
*Roemeria refracta* (Papaveraceae)

jnp 53, 666 '90

the N-oxide:

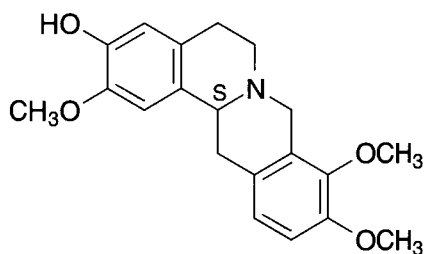
### Roemecarine N-Oxide

*Roemeria carica* (Papaveraceae) het 24, 1227 '86



with a (2,N-Me) attack:

### (-)-Corypalmine (-)-Tetrahydrojatrorrhizine 3-Hydroxy-2,9,10-trimethoxy- tetrahydropprotoberberine



*Annona cherimolia* (Annonaceae) pmp 23, 159 '89

*Argemone grandiflora* (Papaveraceae) phy 11, 461 '72

*Berberis julianae* (Berberidaceae) cz 29, 265 '75

*Coptis teeta* (Ranunculaceae) ijcs 28, 97 '51

*Corydalis lutea* (Papaveraceae) phy 33, 943 '93

*Corydalis nobilis* (Papaveraceae) cccc 54, 2009 '89

*Duguetia stelichantha* (Annonaceae) rlq 16, 107 '85

*Enantia chlorantha* (Annonaceae) pmp 9, 296 '75

*Fibraurea chloroleuca* (Menispermaceae) pw 113, 1153 '78

*Glaucium grandiflorum* (Papaveraceae) jnp 49, 1166 '86

*Guatteria discolor* (Annonaceae) jnp 47, 353 '84

*Hydrastis canadensis* (Ranunculaceae) gci 110, 539 '80

*Pachypodanthium confine* (Annonaceae) apf 35, 65 '77

*Pachypodanthium staudtii* (Annonaceae) pw 113, 1153 '78

*Rollinia leptopetala* (Annonaceae) pbl 38, 318 '00

*Stephania mashanica* (Menispermaceae) cty 14, 249 '83

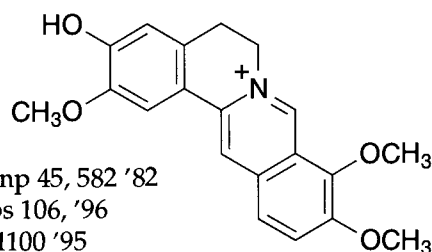
*Stephania micrantha* (Menispermaceae) yhhp 16, 557 '81

*Stephania succifera* (Menispermaceae) zx 31, 544 '89

*Xylopiia vieillardii* (Annonaceae) jnp 54, 466 '91

and aromatization of the c-ring:

**Jatrorrhizine**



*Arcangelisia flava* (Menispermaceae) jnp 45, 582 '82

*Berberis crataegina* (Berberidaceae) kps 106, '96

*Berberis* spp. (Berberidaceae) jnp 58, 1100 '95

*Burasaia australis* (Menispermaceae) bse 19, 433 '91

*Burasaia congesta* (Menispermaceae) bse 19, 433 '91

*Burasaia gracilis* (Menispermaceae) bse 19, 433 '91

*Chasmanthera dependens* (Menispermaceae) pm 46, 228 '82

*Coptis* spp. (Ranunculaceae) phy 21, 1419 '82

*Corydalis* spp. (Papaveraceae) jca 669 1/2, 225 '94

*Coscinium fenestratum* (Menispermaceae) pm 38, 24 '80

*Dioscoreophyllum cumminsii* (Menispermaceae) phy 22, 1671 '83

*Enantia chlorantha* (Annonaceae) pmp 9, 296 '75

*Fagara chalybea* (Rutaceae) kdr 23, 153 '90

*Fibraurea chloroleuca* (Menispermaceae) pw 113, 1153 '78

*Fibraurea recisa* (Menispermaceae) ncyh 2, 77 '82

*Glaucium arabicum* (Papaveraceae) duj 17, 185 '90

*Hydrastis canadensis* (Ranunculaceae) sz 46, 42 '92

*Jatrorrhiza palmata* (Menispermaceae) llyd 28, 73 '65

*Jeffersonia dubia* (Berberidaceae) pm 51, 52 '85

*Mahonia aquifolium* (Berberidaceae) pm 61, 372 '95

*Mahonia* spp. (Berberidaceae) pm 57, 505 '91

*Nandina domestica* (Berberidaceae) phy 27, 2143 '88

*Penianthus zenkeri* (Menispermaceae) phy 30, 1957 '91

*Phellodendron* spp. (Rutaceae) pm 59, 557 '93

*Sphenocentrum jollyanum* (Menispermaceae) phy 15, 2027 '76

*Stephania glabra* (Menispermaceae) jnp 45, 407 '82

*Stephania intermedia* (Menispermaceae) yhtp 16, 1 '85

*Stephania miyiensis* (Menispermaceae) zh 30, 250 '99

*Stephania viridiflavens* (Menispermaceae) cty 12, 1 '81

*Thalictrum* spp. (Ranunculaceae) jnp 43, 372 '80

*Tinospora* spp. (Menispermaceae) pm 48, 275 '83

*Xanthorhiza simplicissima* (Ranunculaceae) llyd 26, 254 '63

*Zanthoxylum chalybeum* (Rutaceae) jnp 59, 316 '96

with a (2,8) attack:

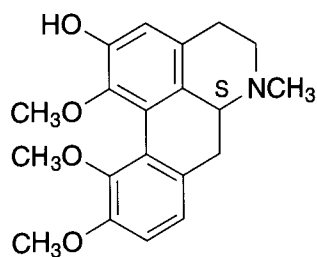
**N,O-Dimethylhernovine**  
**N-Methyl-10-O-methylhernovine**

*Croton linearis* (Euphorbiaceae)

llyd 32, 1 '69

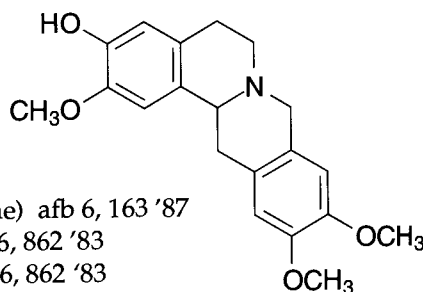
*Croton wilsonii* (Euphorbiaceae)

rlq 1, 140 '70



with a (6,N-Me) attack:

**Discretine**



*Caryomene olivascens* (Menispermaceae) afb 6, 163 '87

*Duguetia obovata* (Annonaceae) jnp 46, 862 '83

*Guatteria discolor* (Annonaceae) jnp 46, 862 '83

*Guatteria scandens* (Annonaceae) jnp 46, 335 '83

*Pachypodanthium staudtii* (Annonaceae) pmp 11, 315 '77

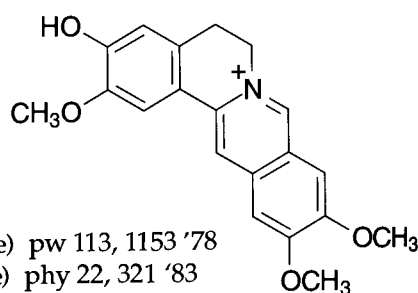
*Stephania suberosa* (Menispermaceae) phy 26, 547 '87

*Xylopiya discreta* (Annonaceae) bull 1

*Xylopiya vieillardii* (Annonaceae) jnp 54, 466 '91

and aromatization of the c-ring:

**Dehydrodiscretine**  
**Pseudojatrorrhizine**



*Fibraurea chloroleuca* (Menispermaceae) pw 113, 1153 '78

*Heptacyclum zenkeri* (Menispermaceae) phy 22, 321 '83

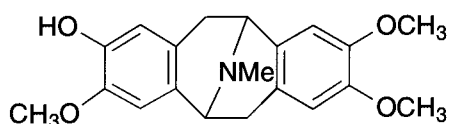
*Penianthus zenkeri* (Menispermaceae) phy 22, 321 '83

*Sinomenium acutum* (Menispermaceae) nm 48, 287 '94

*Thalictrum fauriei* (Ranunculaceae) jps 69, 1061 '80

*Xylopiya vieillardii* (Annonaceae) jnp 54, 466 '91

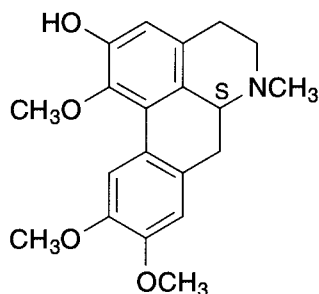
with a (6,3) attack:

**Isonorargemonine***Argemone gracilenta* (Papaveraceae) jnp 46, 293 '83*Argemone munita* (Papaveraceae) jnp 46, 293 '83*Eschscholzia californica* (Papaveraceae) cccc 51, 1743 '86*Eschscholzia douglasii* (Papaveraceae) cccc 51, 1743 '86*Eschscholzia glauca* (Papaveraceae) cccc 51, 1743 '86*Thalictrum minus* (Ranunculaceae) pm 63, 533 '97*Thalictrum revolutum* (Ranunculaceae) jnp 46, 293 '83

also under: 6,7 MeO MeO R Me THIQ

R= 3,4-HO,MeO-benzyl (6,3) attack

with a (6,8) attack:

**(+)-Predicentrine***Annona purpurea* (Annonaceae)

jnp 61, 1457 '98

*Aromadendron elegans* (Magnoliaceae)

phy 31, 2495 '92

*Beilschmiedia podagrica* (Lauraceae)

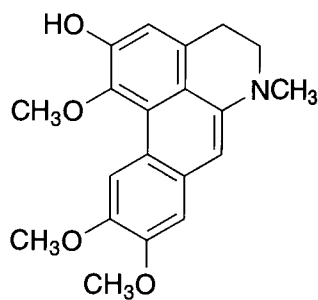
het 9, 903 '78

*Cassytha filiformis* (Lauraceae) prs 12, 39 '98*Corydalis cava* (Papaveraceae) zpn 69, 99 '85*Corydalis* spp. (Papaveraceae) pm 50, 136 '84*Dicentra peregrina* (Papaveraceae) cnc 20, 74 '84*Glaucium leiocarpum* (Papaveraceae) pm 65, 492 '99*Glaucium* spp. (Papaveraceae) cnc 19, 714 '83*Liriodendron tulipifera* (Magnoliaceae) cnc 13, 602 '77*Litsea triflora* (Lauraceae) aqsc 76, 171 '80*Ocotea* spp. (Lauraceae) fes 32, 767 '77*Platycapnos spicata* (Papaveraceae) phy 32, 1055 '93*Polyalthia cauliflora* var. *beccarii* (Annonaceae) jnp 47, 504 '84*Strychnopsis thouarsii* (Menispermaceae) pm 58, 540 '92

and an  $\alpha,1$ -ene:

### Dehydropredicentrine

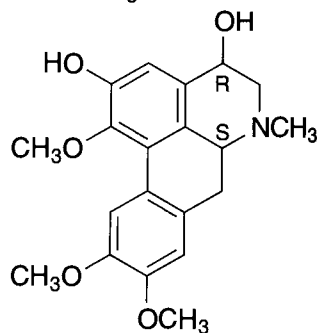
*Polyalthia cauliflora* (Annonaceae)  
jnp 51, 389 '88



with a 4-hydroxy group:

### Srilankine

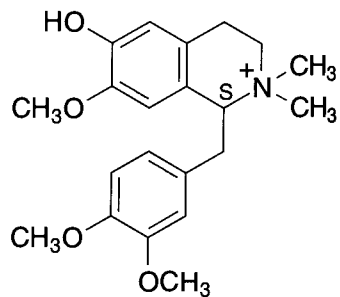
*Alseodaphne semicarpifolia* (Lauraceae)  
jnp 42, 325 '79



6-HO 7-MeO  
3,4-MeO, MeO-benzyl  
Me, Me+ THIQ

### Pseudorine N-Methylpseudolaudanine

*Fagara mayu* (Rutaceae) pm 48, 77 '83  
*Papaver pseudo-orientale* (Papaveraceae) cccc 51, 1752 '86  
*Popowia pisocarpa* (Annonaceae) jnp 49, 1028 '86

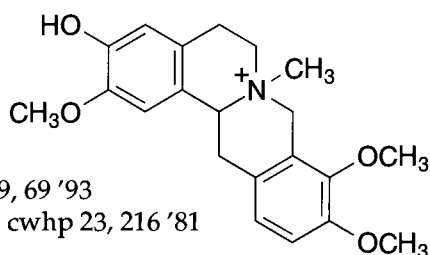


the seco-compound was also isolated from this plant,  
the substitution positions were not determined:

### Pseudoronine

*Papaver pseudo-orientale* (Papaveraceae) cccc 51, 1752 '86

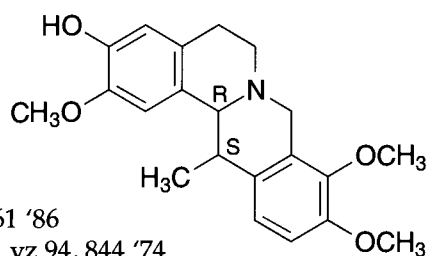
with a (2,N-Me) attack:

**N-Methylcorypalmine**  
 **$\alpha$ -Hainanine***Berberis iliensis* (Berberidaceae) cnc 29, 69 '93*Cyclea hainanensis* (Menispermaceae) cwhp 23, 216 '81

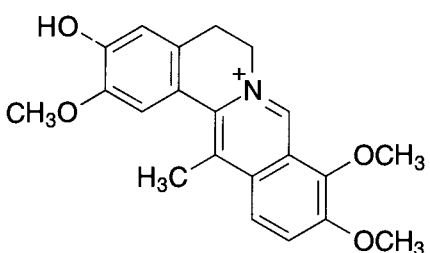
6-HO	7-MeO
3,4-MeO,MeO- $\alpha$ -Me-benzyl	
Me	THIQ

Compound unknown

with a (2,N-Me) attack:

**Corybulbine***Corydalis ambigua* (Papaveraceae)  
sz 42, 214 '88*Corydalis cava* (Papaveraceae) sz 40, 61 '86*Corydalis koidzumiana* (Papaveraceae) yz 94, 844 '74*Corydalis platycarpa* (Papaveraceae) jnp 51, 262 '88*Corydalis nobilis* (Papaveraceae) cccc 54, 2009 '89*Corydalis nokoensis* (Papaveraceae) yz 96, 527 '76*Corydalis remota* (Papaveraceae) jnp 51, 262 '88*Corydalis tuberosa* (Papaveraceae) book 2*Corydalis turtschaninovii* (Papaveraceae) yx 21, 447 '86

and aromatization of the c-ring:

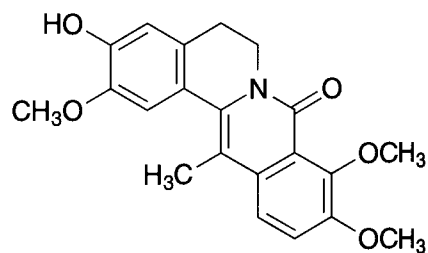
**Dehydrocorybulbine***Berberis baluchistanica* (Berberidaceae)  
daib 38, 686 '77*Corydalis ambigua* (Papaveraceae)  
daib 45, 2160 '85*Corydalis nokoensis* (Papaveraceae) yz 96, 527 '76



and a carbonyl on the original N-Me group:

### Oxydehydrocorybulbine

*Corydalis ambigua* (Papaveraceae)  
daib 45, 2160 '85



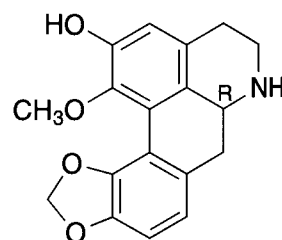
6-HO	7-MeO
3,4-MDO-benzyl	
H	THIQ

Not a natural product.  
cpb 16, 953 '68

with a (2,8) attack:

### Laetine

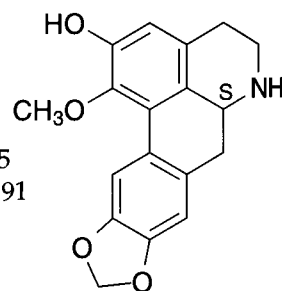
*Hernandia peltata* (Hernandiaceae) cjc 64, 123 '86  
*Litsea laeta* (Lauraceae) phy 19, 998 '80  
*Ocotea teleiandra* (Lauraceae) rlq 23, 18 '92



with a (6,8) attack:

### Norisodomesticine

*Glossocalyx brevipes* (Monimiaceae) jnp 48, 833 '85  
*Guatteria goudotiana* (Annonaceae) phy 30, 2781 '91  
*Laurus nobilis* (Lauraceae) jnp 45, 560 '82  
*Xylopiya danguyella* (Annonaceae) jnp 44, 551 '81

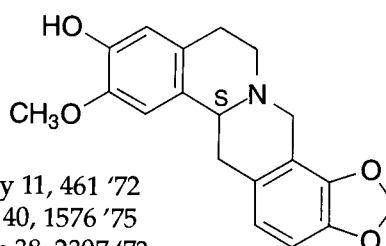


6-HO	7-MeO
3,4-MDO-benzyl	
Me	THIQ

Not a natural product.  
het 1, 223 '73

with a (2,N-Me) attack:

**Cheilanthifoline**



(S)(-)-isomer:

- Argemone grandiflora* (Papaveraceae) phy 11, 461 '72  
*Argemone mexicana* (Papaveraceae) cccc 40, 1576 '75  
*Argemone ochroleuca* (Papaveraceae) cccc 38, 2307 '73  
*Corydalis koidzumiana* (Papaveraceae) yz 94, 844 '74  
*Corydalis* spp. (Papaveraceae) phy 13, 2620 '74  
*Fumaria bella* (Papaveraceae) jnp 49, 178 '86  
*Fumaria capreolata* (Papaveraceae) jnp 49, 178 '86  
*Fumaria parviflora* (Papaveraceae) jnp 44, 475 '81  
*Fumaria vaillantii* (Papaveraceae) phy 22, 2073 '83  
*Papaver commutatum* (Papaveraceae) pm 62, 483 '96

(dl):

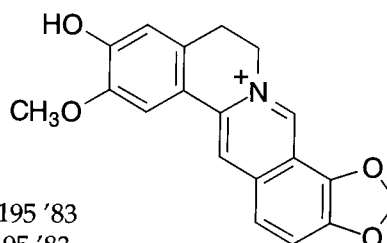
- Dactylicapnos torulosa* (Papaveraceae) phy 36, 519 '94  
*Eschscholzia californica* (Papaveraceae) pm 62, 188 '96

isomer not specified:

- Argemone hybrida* (Papaveraceae) cnc 22, 189 '86  
*Corydalis ochotensis* (Papaveraceae) jccs 34, 157 '87  
*Dicentra spectabilis* (Papaveraceae) cnc 20, 74 '84  
*Fumaria densiflora* (Papaveraceae) jnp 49, 370 '86  
*Menispermum dauricum* (Menispermaceae) yz 91, 684 '71  
*Papaver arenarium* (Papaveraceae) cnc 20, 71 '84  
*Papaver cylindricum* (Papaveraceae) pm 46, 175 '82  
*Papaver fugax* (Papaveraceae) cnc 24, 475 '89  
*Papaver triniaefolium* (Papaveraceae) pm 49, 43 '83

and aromatization of the c-ring:

**Dehydrocheilanthifoline\***  
**Groenlandicine**  
**Tetradehydrocheilanthifoline**



- Coptis chinensis* (Ranunculaceae) sz 37, 195 '83  
*Coptis deltoidea* (Ranunculaceae) sz 37, 195 '83  
*Coptis groenlandica* (Ranunculaceae) pm 21, 313 '72

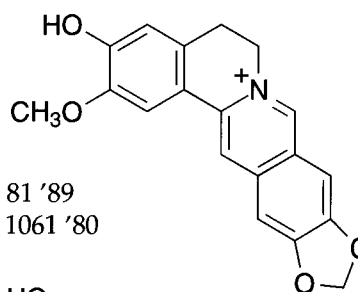
*Coptis japonica* (Ranunculaceae) jnp 47, 189 '84  
*Coptis quinquefolia* (Ranunculaceae) sz 46, 42 '92  
*Coptis trifolia* (Ranunculaceae) phy 31, 717 '92  
*Corydalis humosa* (Papaveraceae) jcpu 20, 261 '89  
*Corydalis ochotensis* (Papaveraceae) jcspt I, 63 '76  
*Corydalis ophiocarpa* (Papaveraceae) yz 98, 1658 '78  
*Fumaria capreolata* (Papaveraceae) pcr 4, 96 '85  
*Fumaria indica* (Papaveraceae) phy 15, 545 '76  
*Menispermum canadense* (Menispermaceae) llyd 34, 292 '71  
*Nandina domestica* (Berberidaceae) phy 27, 2143 '88  
*Thalictrum glandulosissimum* (Ranunculaceae) pm 53, 498 '87

\*This name has also been given to the 6-MeO 7-HO isomer.

with a (6,N-Me) attack,  
and aromatization of the c-ring:

#### Thalifaurine

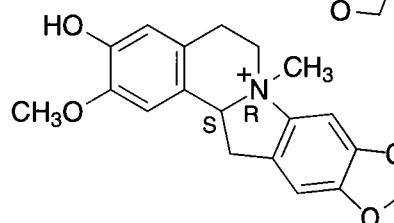
*Coptis quinquefolia* (Ranunculaceae) sz 43, 81 '89  
*Thalictrum fauriei* (Ranunculaceae) jps 69, 1061 '80



with a (6,N) attack:

#### Cryptowolidine

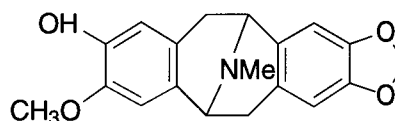
*Cryptocarya phyllostemon* (Lauraceae)  
 cjc 67, 947 '89



with a (6,3) attack:

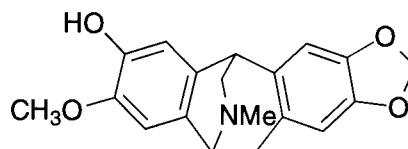
#### (-)-Caryachine

*Cryptocarya chinensis* (Lauraceae) jnp 53, 1267 '90  
*Eschscholzia californica* (Papaveraceae) cccc 51, 1743 '86  
*Eschscholzia douglasii* (Papaveraceae) cccc 51, 1743 '86  
*Eschscholzia glauca* (Papaveraceae) cccc 51, 1743 '86

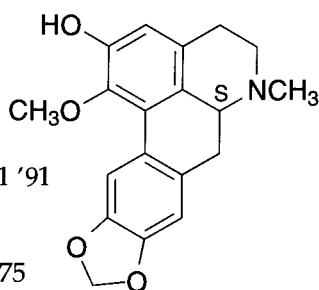


also under: 6,7 MDO R Me THIQ  
 R= 3,4-HO,MeO-benzyl (6,3) attack

with a (6,4) attack:

**Reframoline***Meconopsis speciosa* (Papaveraceae) zh 27, 459 '96*Roemeria refracta* (Papaveraceae) jnp 46, 293 '83

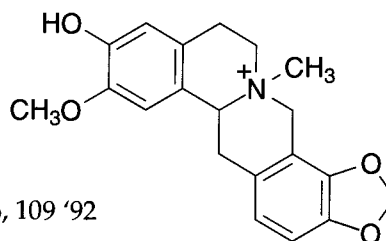
with a (6,8) attack:

**Isodomesticine***Guatteria goudotiana* (Annonaceae) phy 30, 2781 '91*Laurus nobilis* (Laraceae) jnp 45, 560 '82*Litsea* spp. (Laraceae) jccs 39, 453 '92*Nandina domestica* (Berberidaceae) jnp 38, 275 '75*Neolitsea villosa* (Laraceae) cpj 47, 69 '95*Platycapnos spicata* (Papaveraceae) phy 32, 1055 '93

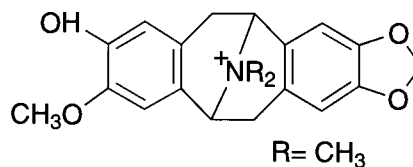
6-HO	7-MeO
3,4-MDO-benzyl	
Me,Me+	THIQ

Compound unknown

with a (2,N-Me) attack:

**N-Methylcheilanthifoline quat***Dicentra spectabilis* (Papaveraceae) sz 46, 109 '92

with a (6,3) attack:

**Caryachine methiodide  
N-Methylcaryachinium quat***Cryptocarya chinensis* (Lauraceae) jnp 42, 163 '79*Eschscholzia californica* (Papaveraceae) cccc 51, 1743 '86

*Eschscholzia douglasii* (Papaveraceae) cccc 51, 1743 '86

*Eschscholzia glauca* (Papaveraceae) cccc 51, 1743 '86

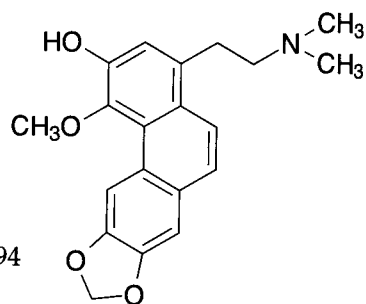
also under: 6,7 MDO R Me,Me+ THIQ

R= 3,4-HO,MeO-benzyl (6,3) attack

with a (6,8) attack  
and a 1,2 seco:

**3-O-Demethylthalicthuberine**

*Ocotea insularis* (Lauraceae) jnp 57, 1033 '94



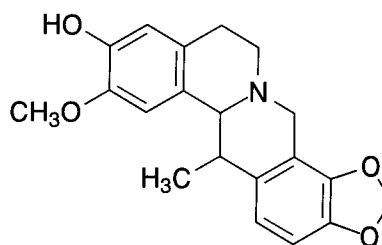
6-HO 7-MeO  
3,4-MDO- $\alpha$ -Me-benzyl  
Me THIQ

Compound unknown

with a (2,N-Me) attack:

**Isoapocavidine**

*Dactylicapnos torulosa* (Papaveraceae)  
phy 36, 519 '94



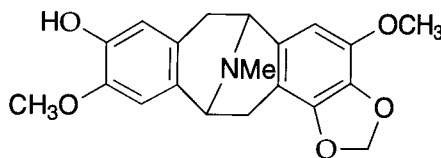
6-HO 7-MeO  
2,3,4-MDO,MeO-benzyl  
Me THIQ

Compound unknown

with a (6,3) attack:

**(-)-9-Demethylthalimonine**

*Thalictrum simplex* (Ranunculaceae) pm 59, 262 '93



also under: 5,6,7 MDO MeO R Me THIQ

R= 3,4-HO,MeO-benzyl (6,3) attack

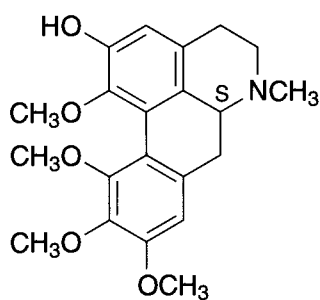
6-HO	7-MeO
3,4,5-MeO,MeO,MeO-benzyl	
Me	THIQ

Compound unknown

with a (2,8) attack:

**Acutifolidine**

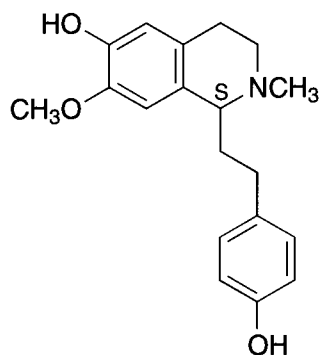
*Thalictrum acutifolium* (Ranunculaceae)  
jnp 57, 1033 '94



6-HO	7-MeO
$\beta$ -(4-HO-phenyl)ethyl	
Me	THIQ

**(S)-Colchiethanamine**

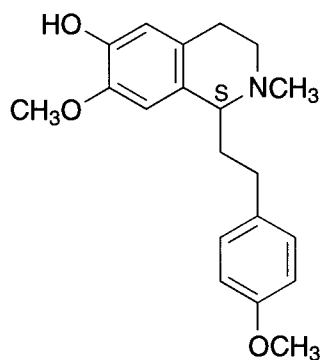
*Colchicum szovitsii* (Liliaceae) jnp 53, 634 '90



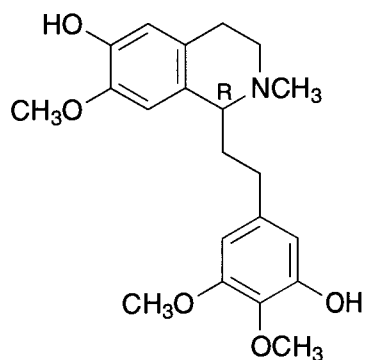
6-HO	7-MeO
$\beta$ -(4-MeO-phenyl)ethyl	
Me	THIQ

**(S)-Colchiethine**

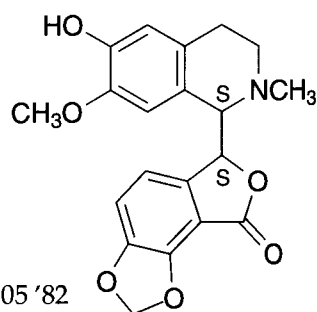
*Colchicum szovitsii* (Liliaceae) jnp 53, 634 '90



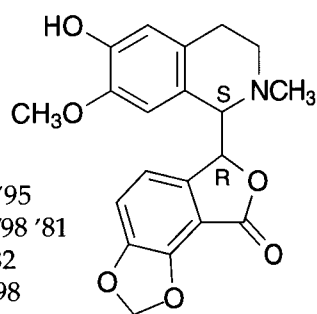
6-HO	7-MeO
$\beta$ -(3,4,5-HO,MeO,MeO-phenyl)ethyl	
Me	THIQ

**(-)-Isoautumnaline***Colchicum ritchii* (Liliaceae) jnp 50, 684 '87

6-HO	7-MeO
6',7'-MDO-isobenzofuranone, 3'-yl	
Me	THIQ

**Corledine  
6-O-Demethyladlumine***Corydalis ledebouriana* (Papaveraceae) jnp 45, 105 '82*Fumaria parviflora* (Papaveraceae) ojc 14, 217 '98*Fumaria vaillantii* (Papaveraceae) tet 39, 577 '83**Corlumidine**

(+) - isomer:

*Corydalis decumbens* (Papaveraceae) jcps 4, 57 '95*Corydalis linarioides* (Papaveraceae) yhhp 16, 798 '81*Corydalis scouleri* (Papaveraceae) jnp 45, 105 '82*Fumaria parviflora* (Papaveraceae) ojc 14, 217 '98

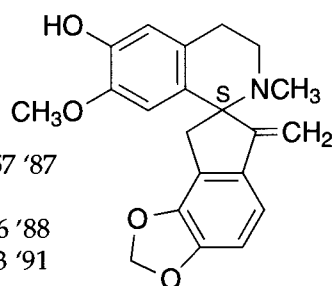
6-HO	7-MeO
3,4-MDO- $\alpha$ -(=CH <sub>2</sub> )-benzyl, Me	
Me	THIQ

Compound unknown

with a (2,1-Me) attack:

**(+)-Ochotensine**

*Corydalis ochotensis* (Papaveraceae) jccs 34, 157 '87  
*Corydalis solida* (Papaveraceae) cjc 56, 383 '78  
*Corydalis stewartii* (Papaveraceae) jnp 51, 1136 '88  
*Corydalis thyrsiflora* (Papaveraceae) yx 26, 303 '91



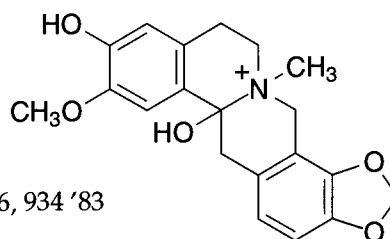
6-HO 7-MeO  
 3,4-MDO-benzyl, HO  
 Me,Me+ THIQ

Compound unknown

with a (2,N-Me) attack:

**Izmirine**

*Fumaria parviflora* (Papaveraceae) jnp 46, 934 '83





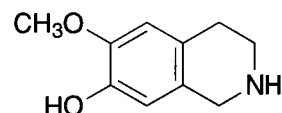
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 6,7-MeO,HO-ISOQUINOLINES
 

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6-MeO	7-HO
H	
H	THIQ

Norcorypalline

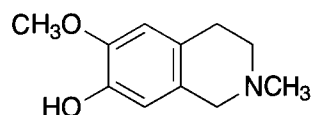


*Ziziphus rugosa* (Rhamnaceae) phy 27, 1915 '88

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6-MeO	7-HO
H	
Me	THIQ

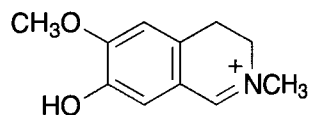
Corypalline



*Berberis nummularia* (Berberidaceae) cnc 33, 70 '97  
*Berberis turcomannica* (Berberidaceae) cnc 29, 63 '93  
*Berberis valdiviana* (Berberidaceae) fit 64, 378 '93  
*Corydalis ophiocarpa* (Papaveraceae) yz 98, 1658 '78  
*Corydalis speciosa* (Papaveraceae) yz 95, 838 '75  
*Corydalis stricta* (Papaveraceae) kps 19, 461 '83  
*Doryphora sassafras* (Monimiaceae) llyd 37, 493 '74  
*Islaya minor* (Cactaceae) jc 189, 79 '80  
*Menispermum dauricum* (Menispermaceae) tcyk 5, 30 '93  
*Papaver bracteatum* (Papaveraceae) phy 22, 247 '83  
*Stephania cepharantha* (Menispermaceae) nm 52, 541 '98  
*Thalictrum dasycarpum* (Ranunculaceae) joc 34, 1062 '69  
*Thalictrum rugosum* (Ranunculaceae) jnp 43, 143 '80  
*Thalictrum uchiyamai* (Ranunculaceae) kjp 13, 132 '82  
*Xylopia vieillardii* (Annonaceae) jnp 54, 466 '91

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6-MeO	7-HO
H	
Me	DHIQ

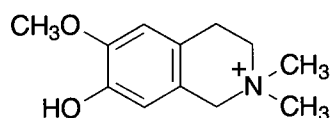
 (+)-Pycnarrhine  
 Dehydrocorypalline


*Arcangelisia flava* (Menispermaceae) jnp 45, 582 '82  
*Corydalis ophiocarpa* (Papaveraceae) yz 98, 1658 '78

*Corydalis stricta* (Papaveraceae) kps 4, 490 '83

*Pycnarrhena longifolia* (Menispermaceae) phy 20, 323 '81

6-MeO	7-HO
H	
Me, Me+	THIQ

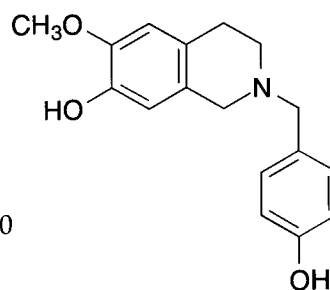


**2-Methylcorypallinium**  
**N-Methylcorypalline**

*Corydalis stricta* (Papaveraceae) kps 4, 490 '83

6-MeO	7-HO
H	
4-HO-benzyl	THIQ

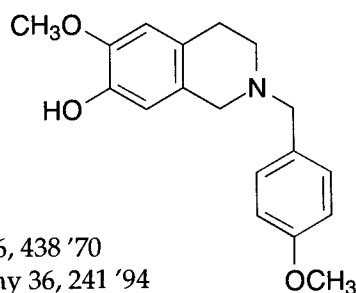
**Corgoine**



*Ceratocapnos* sp. (Papaveraceae) kps 7, 211 '70

*Corydalis* sp. (Papaveraceae) kps 6, 638 '70

6-MeO	7-HO
H	
4-MeO-benzyl	THIQ



**Sendaverine**

*Corydalis gortschakovii* (Papaveraceae) kps 6, 438 '70

*Ceratocapnos heterocarpa* (Papaveraceae) phy 36, 241 '94

*Corydalis impatiens* (Papaveraceae) patent 3

*Corydalis tashiroi* (Papaveraceae) pm 41, 403 '81

the N-oxide:

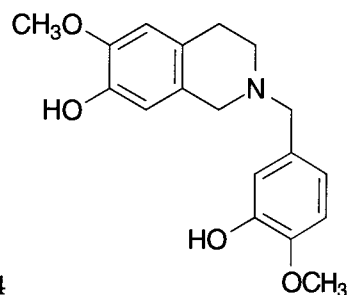
**Sendaverine N-oxide**

*Corydalis gortschakovii* (Papaveraceae) kps 6, 834 '77

6-MeO	7-HO
H	
3,4-HO,MeO-benzyl	THIQ

**Capnosine**

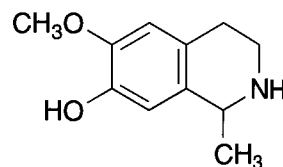
*Ceratocapnos heterocarpa* (Papaveraceae) phy 36, 241 '94  
*Corydalis* sp. (Papaveraceae) phy 36, 241 '94



6-MeO	7-HO
Me	
H	THIQ

**Isosalsoline**

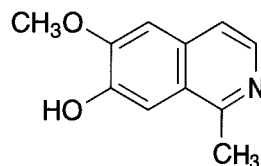
*Hammada articulata* (Chenopodiaceae) apf 48, 219 '90  
*Pachycereus pecten-aboriginum* (Cactaceae) aps 15, 127 '78



6-MeO	7-HO
Me	
H	IQ

**7-O-Desmethylosalsolidine**

*Hernandia nymphaeifolia* (Hernandiaceae) phy 42, 1479 '96



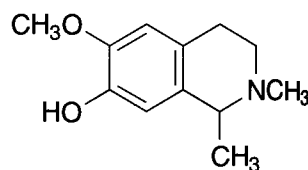
6-MeO	7-HO
Me	
Me	THIQ

**1-Methylcorypalline  
N-Methylosalsoline**

(R)(+)-isomer:  
*Corydalis ambigua* (Papaveraceae) phy 12, 3008 '73

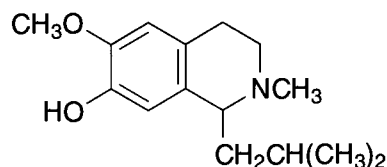
(S)(-)-isomer:  
*Arthrocnemum glaucum* (Chenopodiaceae) phy 31, 1023 '92

isomer not specified:  
*Haloxylon articulatum* (Chenopodiaceae) book 6



6-MeO	7-HO
i-Bu	
Me	THIQ

**Lophocereine**  
**Lophocerine**



*Lophocereus schottii* (Cactaceae) phy 8, 1481 '69

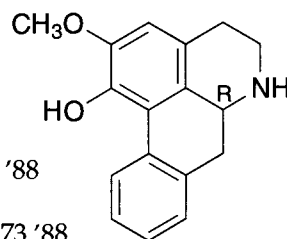
*Pachycereus marginatus* (Cactaceae) book 6

6-MeO	7-HO
benzyl	
H	THIQ

Not a natural product.  
joc 41, 443 '76

with a (2,8) attack:

**Caaverine**



*Isolona pilosa* (Annonaceae) pm 50, 23 '84

*Liriodendron tulipifera* (Magnoliaceae) cnc 23, 521 '88

*Liriodendron* sp. (Magnoliaceae) jnp 38, 275 '75

*Neostenanthera gabonensis* (Annonaceae) jnp 51, 973 '88

*Ocotea glaziovii* (Lauraceae) fes 30, 479 '75

*Ocotea* sp. (Lauraceae) jnp 38, 275 '75

*Papaver pseudo-orientale* (Papaveraceae) paz 13, 50 '77

*Polyalthia acuminata* (Annonaceae) jnp 45, 471 '82

*Symplocos celastrinea* (Symplocaceae) llyd 33s, 1 '70

*Symplocos* sp. (Symplocaceae) jnp 38, 275 '75

*Ziziphus jujuba* (Rhamnaceae) apr 12, 263 '89

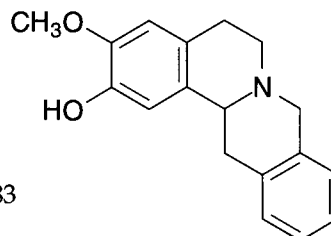
*Ziziphus spinosus* (Rhamnaceae) sh 16, 233 '86

6-MeO	7-HO
benzyl	
Me	THIQ

Not a natural product.  
jhc 4, 417 '67

with a (2,N-Me) attack:

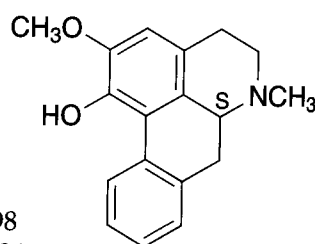
**Bharatamine**



*Alangium lamarckii* (Alangiaceae) tl 24, 291 '83

with a (2,8) attack:

**Lirinidine**  
**Nornuciferine I**



Lirinidine:

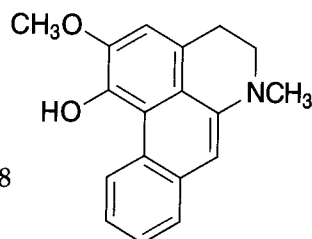
- Annona purpurea* (Annonaceae) phy 49, 2015 '98  
*Artabotrys venustus* (Annonaceae) jnp 49, 602 '86  
*Guatteria sagotiana* (Annonaceae) jnp 49, 1078 '86  
*Isolona zenkeri* (Annonaceae) pm 50, 23 '84  
*Liriodendron tulipifera* (Magnoliaceae) cnc 23, 521 '88  
*Nelumbo nucifera* (Nymphaeaceae) jnp 50, 773 '87  
*Neostenanthera gabonensis* (Annonaceae) jnp 51, 973 '88  
*Ocotea macrophylla* (Lauraceae) pptp 27, 65 '93  
*Papaver* spp. (Papaveraceae) pm 41, 105 '81

Nornuciferine I:

- Croton bonplandianus* (Euphorbiaceae) abs 10  
*Croton sparsiflorus* (Euphorbiaceae) tet 35, 2323 '79

and an  $\alpha,1$ -ene:

**Dehydrolirinidine**



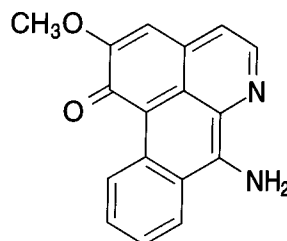
- Annona purpurea* (Annonaceae) jnp 61, 1457 '98

6-MeO	7-HO
$\alpha$ -NH <sub>2</sub> -benzyl	
H	IQ

Compound unknown

with a (2,8) attack  
aromatization and oxidation:

**Telazoline**



- Telotoxicum peruvianum* (Menispermaceae)  
 jnp 44, 320 '81

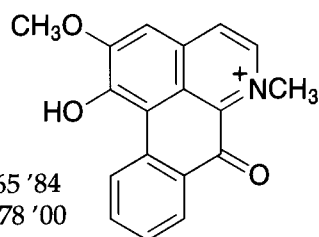
6-MeO	7-HO
$\alpha$ -keto-benzyl	
Me+	IQ

Compound unknown

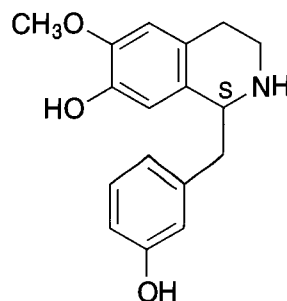
with a (2,8) attack:

**O,N-Dimethyliriodendronine**

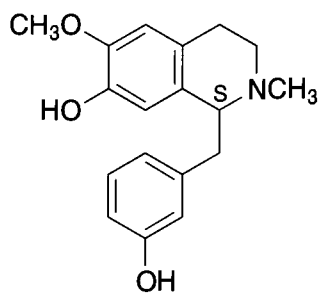
*Guatteria chrysopetala* (Annonaceae) pmp 18, 165 '84  
*Stephania dinklagei* (Menispermaceae) pm 66, 478 '00



6-MeO	7-HO
3-HO-benzyl	
H	THIQ

**(-)-Norcanelilline***Aniba canelilla* (Lauraceae) cjc 71, 1128 '93

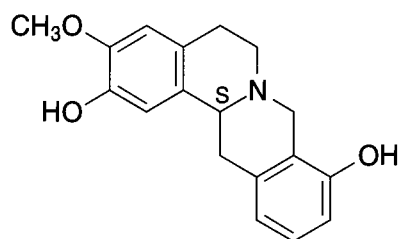
6-MeO	7-HO
3-HO-benzyl	
Me	THIQ

**Canelilline***Aniba canelilla* (Lauraceae) cjc 71, 1128 '93

with a (2,N-Me) attack:

**Anibacanine**

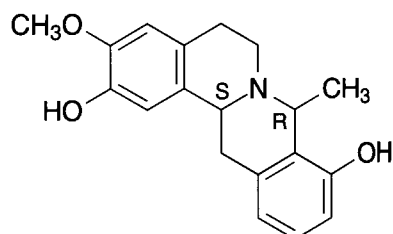
*Aniba canelilla* (Lauraceae)  
 cjc 71, 1128 '93



and a methyl group on the original N-Me group:

**(-)- $\alpha$ -8-Methylanibacanine**

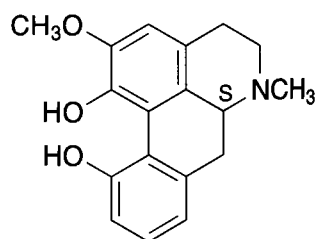
*Aniba canelilla* (Lauraceae)  
cjc 71, 1128 '93



with a (2,8) attack:

**Isothebaidine**

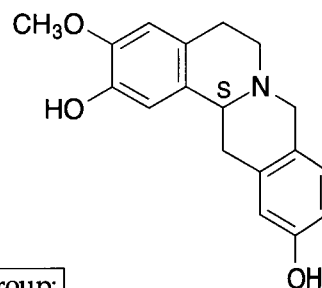
*Papaver orientale* (Papaveraceae)  
cnc 14, 402 '78



with a (6,N-Me) attack:

**(-)-Pseudoanibacanine**

*Aniba canelilla* (Lauraceae) cjc 71, 1128 '93

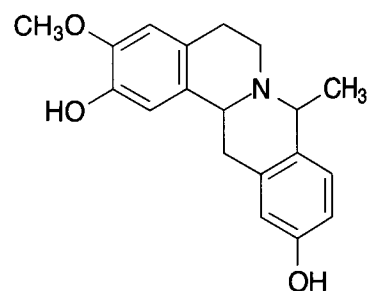


and a methyl group on the original N-Me group:

the cis isomer:

**(-)-8 $\alpha$ -Methylpseudoanibacanine**

*Aniba canelilla* (Lauraceae)  
cjc 71, 1128 '93



the trans isomer:

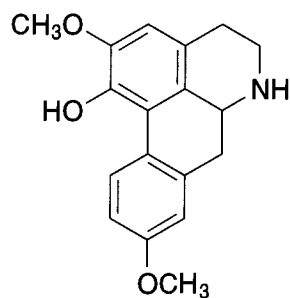
**(-)-8 $\beta$ -Methylpseudoanibacanine**

*Aniba canelilla* (Lauraceae)  
cjc 71, 1128 '93

6-MeO	7-HO
3-MeO-benzyl	
H	THIQ

Compound unknown

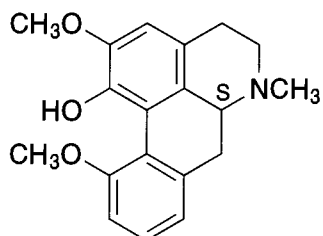
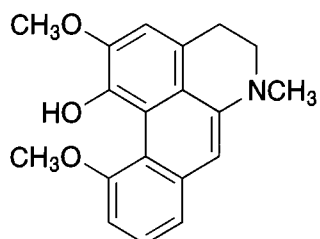
with a (6,8) attack:

**Nororientinine***Ocotea caesia* (Lauraceae) jnp 57, 1033 '94

6-MeO	7-HO
3-MeO-benzyl	
Me	THIQ

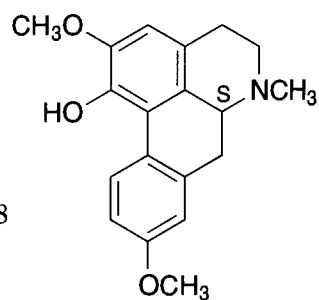
Not a natural product.  
cpb 29, 1083 '81

with a (2,8) attack:

**Isothebaine***Discaria serratifolia* (Rhamnaceae)  
jnp 47, 1040 '84*Papaver atlanticum* (Papaveraceae)  
cccc 51, 2232 '86*Papaver bracteatum* (Papaveraceae) pm 32, 60 '77*Papaver nudicaule* (Papaveraceae) zpf 114, 361 '84*Papaver orientale* (Papaveraceae) jps 66, 1050 '77*Papaver pseudo-orientale* (Papaveraceae) paz 13, 50 '77*Papaver setigerum* (Papaveraceae) zpf 114, 361 '84*Papaver somniferum* (Papaveraceae) zpf 114, 361 '84and an  $\alpha,1$ -ene:**Dehydroisothebaine***Papaver orientale* (Papaveraceae)  
jnp 51, 389 '88



with a (6,8) attack:

**Orientinine***Papaver orientale* (Papaveraceae) jnp 51, 389 '88

6-MeO	7-HO
3-MeO-benzyl	
Me, Me+	THIQ

Compound unknown

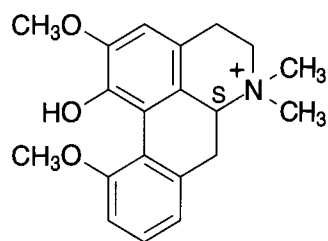
with a (2,8) attack:

**N-Methylisothebainium cation**  
**N-Methylisothebaine**
*Papaver bracteatum* (Papaveraceae)

jnp 51, 389 '88

*Papaver pseudo-orientale* (Papaveraceae)

cccc 51, 1752 '86



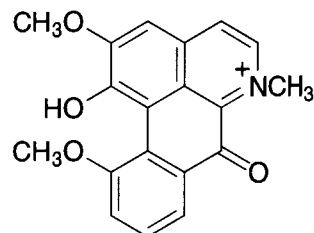
6-MeO	7-HO
3-MeO- $\alpha$ -keto-benzyl	
Me	IQ

Compound unknown

with a (2,8) attack:

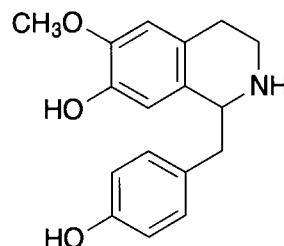
**Alkaloid PO-3***Papaver orientale* (Papaveraceae)

jnp 38, 275 '75



6-MeO	7-HO
4-HO-benzyl	
H	THIQ

**Coclaurine**  
**Machiline**  
**Sanjoinine K**



(S)(-)-isomer of Coclaurine

Machiline:

- Alseodaphne archboldiana* (Lauraceae) het 9, 903 '78  
*Aniba canelilla* (Lauraceae) cjc 71, 1128 '93  
*Annona montana* (Annonaceae) pmp 16, 169 '82  
*Annona reticulata* (Annonaceae) jcspt I, 1515, '79  
*Cocculus hirsutus* (Menispermaceae) npl 2, 105 '93  
*Cocculus pendulus* (Menispermaceae) jpac 32, 250 '60  
*Corydalis gortschakovii* (Papaveraceae) kps 6, 638 '70  
*Corydalis paniculigera* (Papaveraceae) cnc 18, 689 '82  
*Corydalis pseudoadunca* (Papaveraceae) cnc 21, 807 '86  
*Cryptocarya longifolia* (Lauraceae) ajc 34, 195 '81  
*Fumaria parviflora* (Papaveraceae) cnc 18, 608 '82  
*Fumaria vaillantii* (Papaveraceae) cnc 17, 437 '81  
*Litsea glutinosa* (Lauraceae) abs 10  
*Litsea lecardii* (Lauraceae) pm 52, 74 '86  
*Machilus acuminatissima* (Lauraceae) het 9, 903 '78  
*Machilus kusanoi* (Lauraceae) het 9, 903 '78  
*Magnolia salicifolia* (Magnoliaceae) pm 48, 43 '83  
*Mezilaurus synandra* (Lauraceae) phy 22, 772 '83  
*Nymphaea stellata* (Nymphaeaceae) jics 63, 530 '86  
*Pachygone ovata* (Menispermaceae) daib 45, 567 '84  
*Peumus boldus* (Monimiaceae) fit 64, 455 '93  
*Phoebe minutiflora* (Lauraceae) cpj 49, 217 '97  
*Polyalthia macropoda* (Annonaceae) phy 29, 3845 '90  
*Retanilla ephedra* (Rhamnaceae) rlq 5, 158 '74  
*Stephania pierrei* (Menispermaceae) jnp 52, 846 '89  
*Xylopiu papuana* (Annonaceae) npl 6, 57 '95  
*Ziziphus jujuba* (Rhamnaceae) apr 12, 263 '89  
*Ziziphus spinosus* (Rhamnaceae) kjp 16, 44 '85  
*Ziziphus vulgaris* (Rhamnaceae) apr 10, 203 '87

(R)(+)-isomer of Coclaurine

Sanjoinine K:

- Abuta pahni* (Menispermaceae) phy 26, 2136 '87

*Alseodaphne archboldiana* (Lauraceae) het 9, 903 '78  
*Annona muricata* (Annonaceae) pm 42, 37 '81  
*Bongardia chrysogonum* (Berberidaceae) jnp 52, 818 '89  
*Caryomene olivascens* (Menispermaceae) afb 6, 163 '87  
*Cassytha racemosa* (Lauraceae) het 9, 903 '78  
*Cocculus laurifolius* (Menispermaceae) tet 36, 3107 '80  
*Colubrina faralaostra* ssp. *sinuata* (Rhamnaceae) pm 30, 201 '76  
*Corydalis severtzovii* (Papaveraceae) cnc 11, 826 '75  
*Cyclea barbata* (Menispermaceae) jnp 56, 1989 '93  
*Cyclea peltata* (Menispermaceae) jnp 56, 1989 '93  
*Discaria pubescens* (Rhamnaceae) pm 50, 454 '84  
*Litsea triflora* (Lauraceae) aqsc 76, 171 '80  
*Magnolia fargesii* (Magnoliaceae) pm 48, 43 '83  
*Magnolia liliflora* (Magnoliaceae) yhtp 20, 522 '85  
*Magnolia salicifolia* (Magnoliaceae) pm 48, 43 '83  
*Nectandra salicifolia* (Lauraceae) jnp 59, 576 '96  
*Neolitsea villosa* (Lauraceae) cpj 47, 69 '95  
*Peumus boldus* (Monimiaceae) fit 64, 455 '93  
*Polyalthia acuminata* (Annonaceae) jnp 45, 471 '82  
*Popowia pisocarpa* (Annonaceae) jnp 49, 1028 '86  
*Roemeria refracta* (Papaveraceae) hca 75, 260 '92  
*Sciadotenia eichleriana* (Menispermaceae) jnp 48, 69 '85  
*Sparattanthelium uncigerum* (Hernandiaceae) jnp 48, 333 '85  
*Stephania cepharantha* (Menispermaceae) cpb 45, 470 '97  
*Stephania excentrica* (Menispermaceae) jnp 60, 294 '97  
*Ziziphus jujuba* (Rhamnaceae) apr 12, 263 '89  
*Ziziphus vulgaris* (Rhamnaceae) apr 12, 263 '89

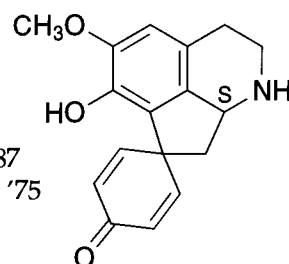
(dl)-Coclaurine:

*Cocculus hirsutus* (Menispermaceae) ijc 14b, 62 '76  
*Cryptocarya konishii* (Lauraceae) het 9, 903 '78  
*Machilus acuminatissima* (Lauraceae) het 9, 903 '78  
*Machilus macrantha* (Lauraceae) het 9, 903 '78  
*Peumus boldus* (Monimiaceae) fit 64, 455 '93  
*Polyalthia acuminata* (Annonaceae) jnp 45, 471 '82  
*Retanilla ephedra* (Rhamnaceae) rlq 5, 158 '74  
*Talguenea quinquenervis* (Rhamnaceae) aaqa 62, 361 '74  
*Xylopiya papuana* (Annonaceae) llyd 33s, 1 '70  
*Ziziphus jujuba* (Rhamnaceae) kps 13, 239 '77

with a (1,8) attack:

**Crotsparine**  
**Crotoflorine**

*Alphonsea sclerocarpa* (Annonaceae) jnp 50, 518 '87  
*Croton bonplandianus* (Euphorbiaceae) jcspt 1659 '75  
*Croton flavens* (Euphorbiaceae) llyd 32, 1 '69  
*Croton ruizianus* (Euphorbiaceae) bse 24, 463 '96  
*Croton sparsiflorus* (Euphorbiaceae) llyd 32, 1 '69  
*Monodora brevipes* (Annonaceae) phy 28, 2489 '89  
*Ocotea glaziovii* (Lauraceae) het 9, 903 '78



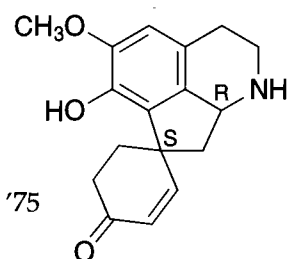
with reduction of the  
benzyl 2,3 double-bond:

**(1S-cis) (+)-Crotsparinine**

*Croton bonplandianus* (Euphorbiaceae) jcspt 1659 '75

**(1R-trans) (-)-Jacularine**

*Croton discolor* (Euphorbiaceae) rlq 1, 140 '70  
*Croton echinocarpus* (Euphorbiaceae) llyd 32, 1 '69  
*Croton linearis* (Euphorbiaceae) llyd 32, 1 '69  
*Croton plumieri* (Euphorbiaceae) rlq 1, 140 '70  
*Croton ruizianus* (Euphorbiaceae) bse 24, 463 '96  
*Croton sparsiflorus* (Euphorbiaceae) exp 25, 354 '69



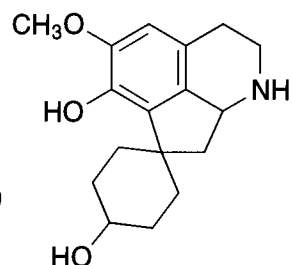
R,S is Crotsparinine  
R,R is Jacularine

with reduction of both double bonds  
and of the carbonyl group in the benzyl ring:

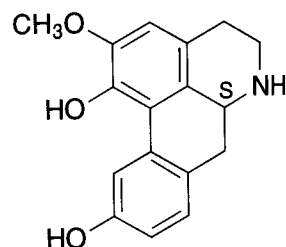
**Oridine**  
**Oreoline**

(-)-isomer:

*Papaver lisae* (Papaveraceae) cnc 14, 228 '78  
*Papaver oreophilum* (Papaveraceae) frm 29, 23 '80



with a (2,8) attack:

**Sparsiflorine  
Apocrotsparine**

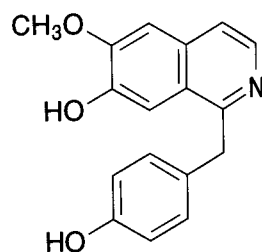
(-)-isomer:

*Monodora tenuifolia* (Annonaceae) pm 50, 455 '84

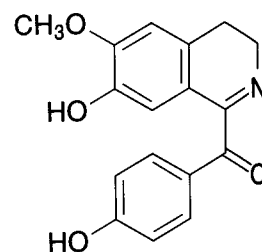
isomer not specified:

*Alphonsea sclerocarpa* (Annonaceae) jnp 50, 518 '87*Croton bonplandianus* (Euphorbiaceae) jcspt I, 1659 '75*Croton flavens* (Euphorbiaceae) llyd 32, 1 '69*Thalictrum foliolosum* (Ranunculaceae) jnp 45, 252 '82

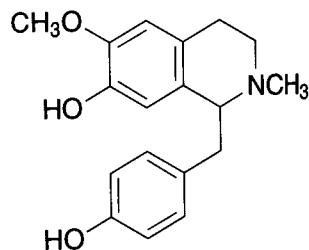
6-MeO	7-HO
4-HO-benzyl	
H	IQ

**Juzirine  
Yuzirine***Ziziphus jujuba* (Rhamnaceae) iant 4, 48 '87*Magnolia fargesii* (Magnoliaceae) pm 48, 43 '83*Magnolia salicifolia* (Magnoliaceae) ws 14, 101 '81

6-MeO	7-HO
4-HO- $\alpha$ -keto-benzyl	
H	DHIQ

**Longifolonine***Cryptocarya velutinoso* (Lauraceae) ajc 34, 195 '81

6-MeO	7-HO
4-HO-benzyl	
Me	THIQ

**N-Methylcoclaurine**

(S)(+)-isomer:

*Aniba canelilla* (Lauraceae) cjc 71, 1128 '93*Desmos tiebaghiensis* (Annonaceae) jnp 45, 617 '82*Stephania cepharantha* (Menispermaceae) cpb 45, 470 '97

*Stephania pierrei* (Menispermaceae) jnp 52, 846 '89  
*Thalictrum revolutum* (Ranunculaceae) llyd 40, 593 '77

(R)(-)-isomer:

*Aniba burchellii* (Lauraceae) bse 8, 51 '80  
*Aniba cylindriflora* (Lauraceae) bse 8, 51 '80  
*Aniba simulans* (Lauraceae) bse 8, 51 '80  
*Berberis lycium* (Berberidaceae) daib 44, 1458 '83  
*Ceratocarpus palaestinus* (Papaveraceae) jnp 53, 1006 '90  
*Cryptocarya longifolia* (Lauraceae) ajc 34, 195 '81  
*Cyclea peltata* (Menispermaceae) jnp 56, 1989 '93  
*Discaria serratifolia* var. *discolor* (Rhamnaceae) jnp 42, 430 '79  
*Discaria toumatou* (Rhamnaceae) jnp 45, 777 '82  
*Glaucium fimbriigerum* (Papaveraceae) cnc 16, 177 '80  
*Glaucium leiocarpum* (Papaveraceae) pm 65, 492 '99  
*Guatteria sagotiana* (Annonaceae) jnp 49, 1078 '86  
*Litsea triflora* (Lauraceae) aqsc 76, 171 '80  
*Magnolia fargesii* (Magnoliaceae) pm 48, 43 '83  
*Magnolia salicifolia* (Magnoliaceae) pm 48, 43 '83  
*Thalictrum dioicum* (Ranunculaceae) llyd 41, 169 '78  
*Xylopija pancheri* (Annonaceae) pm 30, 48 '76  
*Xylopija vieillardii* (Annonaceae) jnp 54, 466 '91  
*Ziziphus mucronata* (Rhamnaceae) phy 13, 2328 '74

(dl):

*Berberis actinacantha* (Berberidaceae) daib 45, 2160 '85  
*Berberis boliviana* (Berberidaceae) jnp 52, 81 '89  
*Bongardia chrysogonum* (Berberidaceae) jnp 52, 818 '89  
*Polyalthia acuminata* (Annonaceae) jnp 45, 471 '82  
*Roemeria refracta* (Papaveraceae) hca 75, 260 '92  
*Tiliacora racemosa* (Menispermaceae) cc 226 '78

isomer not specified:

*Aniba muca* (Lauraceae) rbq 13, 19 '96  
*Annona squamosa* (Annonaceae) cpj 46, 439 '94  
*Artabotrys odoratissimus* (Annonaceae) fit 65, 92 '94  
*Berberis iliensis* (Berberidaceae) cnc 29, 69 '93  
*Berberis nummularia* (Berberidaceae) cnc 29, 335 '93  
*Berberis valdiviana* (Berberidaceae) fit 64, 378 '93  
*Cocculus laurifolius* (Menispermaceae) ijc 26b, 24 '87  
*Corydalis gortschakovii* (Papaveraceae) cnc 20, 245 '84  
*Discaria crenata* (Rhamnaceae) phy 12, 954 '73

*Fumaria capreolata* (Papaveraceae) pcr 4, 96 '85  
*Glaucium oxylobum* (Papaveraceae) cnc 20, 244 '84  
*Gyrocarpus americanus* (Hernandiaceae) jnp 49, 101 '86  
*Litsea acuminata* (Lauraceae) cpj 46, 299 '94  
*Nectandra salicifolia* (Lauraceae) jnp 59, 576 '96  
*Retanilla ephedra* (Rhamnaceae) rlq 5, 158 '74  
*Stephania excentrica* (Menispermaceae) zh 27, 586 '96  
*Thalictrum longistylum* (Ranunculaceae) jnp 62, 1410 '99

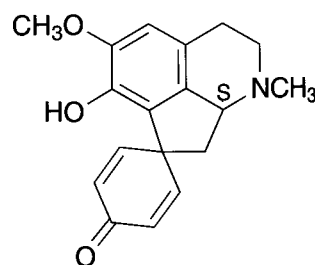
xyloside at the 7-HO position:

#### Latericine

*Papaver californicum* (Papaveraceae) svs 55, 23 '93

with a (1,8) attack:

**N-Methylcrotsparine**  
**Glaziovine**  
**Suavedol**



(R)(+)-isomer:

N-Methylcrotsparine

Glaziovine:

*Annona cherimolia* (Annonaceae) pmp 23, 159 '89

(S)(-)-isomer:

N-Methylcrotsparine

Glaziovine

Suavedol:

*Aniba canelilla* (Lauraceae) cjc 71, 1128 '93

*Annona purpurea* (Annonaceae) jnp 61, 1457 '98

*Aristolochia chilensis* (Aristolochiaceae) fit 61, 190 '90

*Berberis lycium* (Berberidaceae) daib 44, 1458 '83

*Corydalis claviculata* (Papaveraceae) jnp 53, 1280 '90

*Croton bonplandianus* (Euphorbiaceae) tet 37, 3175 '81

*Desmos tiebaghiensis* (Annonaceae) jnp 45, 617 '82

*Guatteria sagotiana* (Annonaceae) jnp 49, 1078 '86

*Isolona zenkeri* (Annonaceae) pm 50, 23 '84

*Liriodendron tulipifera* (Magnoliaceae) cnc 11, 829 '75

*Litsea cubeba* (Lauraceae) jca 667, 322 '94

*Litsea laurifolia* (Lauraceae) pmp 13, 262 '79  
*Meconopsis cambrica* (Papaveraceae) jpps 27, 84p '75  
*Nectandra membranacea* (Lauraceae) pptp 27, 65 '93  
*Nectandra salicifolia* (Lauraceae) jnp 59, 576 '96  
*Neostenanthera gabonensis* (Annonaceae) jnp 51, 973 '88  
*Ocotea brachybotra* (Lauraceae) pptp 27, 65 '93  
*Ocotea glaziovii* (Lauraceae) het 9, 903 '78  
*Ocotea variabilis* (Lauraceae) pptp 27, 65 '93  
*Pachygone ovata* (Menispermaceae) jnp 42, 399 '79  
*Papaver caucasicum* (Papaveraceae) phzi 23, 267 '68  
*Stephania cepharantha* (Menispermaceae) cpb 45, 470 '97  
*Uvaria chamae* (Annonaceae) pmp 14, 143 '80

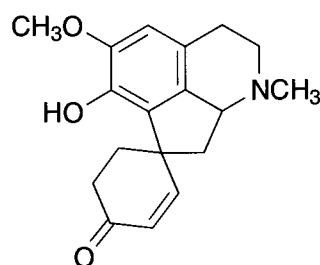
isomer not specified:

*Neolitsea konishii* (Lauraceae) phzi 45, 442 '90

with the reduction of a double bond:

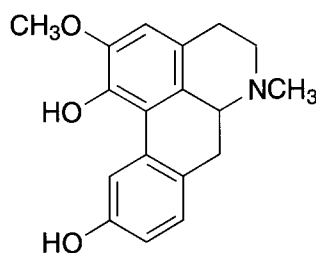
#### N-Methylcrotsparinine

*Croton bonplandianus* (Euphorbiaceae)  
 jcspt I, 1659 '75



with a (2,8) attack:

#### Apoglaziovine N-Methylsparsiflorine N-Methylapocrotsparine



(S)(+)-isomer:

*Aniba canelilla* (Lauraceae) cjc 71, 1128 '93  
*Berberis brandisiana* (Berberidaceae) jnp 49, 538 '86  
*Croton bonplandianus* (Euphorbiaceae) jnp 38, 275 '75  
*Croton sparsiflorus* (Euphorbiaceae) tet 37, 3175 '81  
*Liriodendron tulipifera* (Magnoliaceae) cnc 27, 516 '92  
*Ocotea* sp. (Lauraceae) jnp 38, 275 '75

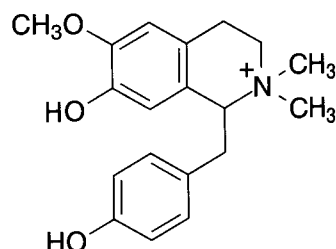
(R)(-)-isomer (Apoglaziovine only):

*Nectandra membranacea* (Lauraceae) fit 60, 474 '89  
*Stephania venosa* (Menispermaceae) jnp 50, 1113 '87

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6-MeO	7-HO
4-HO-benzyl	
Me, Me+	THIQ

**Magnocurarine**

(S)(+)-isomer:

*Euodia trichotoma* (Rutaceae) pm 59, 290 '93*Lindera oldhamii* (Lauraceae) jnp 49, 726 '86*Litsea cubeba* (Lauraceae) het 9, 903 '78

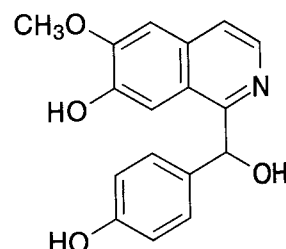
(R)(-)-isomer:

*Colletia hystix* (Rhamnaceae) aaqa 59, 343 '71*Colletia spinosissima* (Rhamnaceae) llyd 33s, 1 '70*Dicentra spectabilis* (Papaveraceae) sz 46, 109 '92*Leontice leontopetalum* (Berberidaceae) jnp 49, 726 '86*Litsea cubeba* (Lauraceae) jnp 56, 1971 '93*Magnolia acuminata* (Magnoliaceae) llyd 33s, 1 '70*Magnolia obovata* (Magnoliaceae) pm 58, 137 '92*Magnolia officinalis* var. *biloba* (Magnoliaceae) nm 50, 413 '96*Magnolia rostrata* (Magnoliaceae) cty 12, 10 '81*Tiliacora racemosa* (Menispermaceae) jic 57, 773 '80

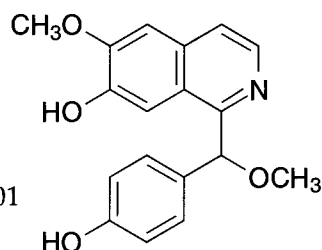
isomer not specified:

*Magnolia anglietia* (Magnoliaceae) yhhp 23, 383 '88*Magnolia sprengeri* (Magnoliaceae) yhhp 23, 383 '88*Magnolia szechuanica* (Magnoliaceae) yhhp 23, 383 '88*Magnolia wilsonii* (Magnoliaceae) yfz 2, 95 '82*Manglietia chingii* (Magnoliaceae) yhhp 24, 295 '89*Manglietia duclouxii* (Magnoliaceae) yhhp 24, 295 '89*Manglietia insignis* (Magnoliaceae) yhhp 24, 295 '89*Manglietia szechuanica* (Magnoliaceae) yhhp 24, 295 '89*Manglietia yuyuanensis* (Magnoliaceae) yhhp 24, 295 '89

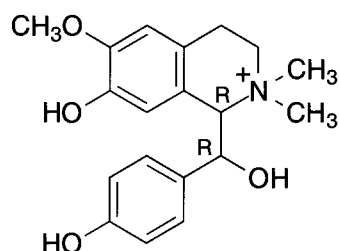
6-MeO	7-HO
4-HO- $\alpha$ -HO-benzyl	
H	IQ

**Annocherine A***Annona cherimolia* (Annonaceae) phy 56, 753 '01

6-MeO	7-HO
4-HO- $\alpha$ -MeO-benzyl	
H	IQ

**Annocherine B***Annona cherimolia* (Annonaceae) phy 56, 753 '01

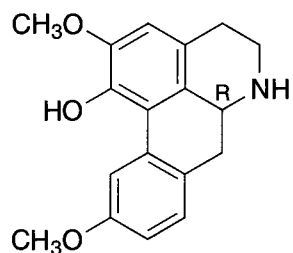
6-MeO	7-HO
4-HO- $\alpha$ -HO-benzyl	
Me, Me+	THIQ

**(+)-1 $\alpha$ -Hydroxymagnocurarine***Cryptocarya konishii* (Lauraceae)  
jnp 56, 1971 '93

6-MeO	7-HO
4-MeO-benzyl	
H	THIQ

Not a natural product.  
Is 30, 1747 '82

with a (2,8) attack:

**Zenkerine  
10-Methoxycaverine**

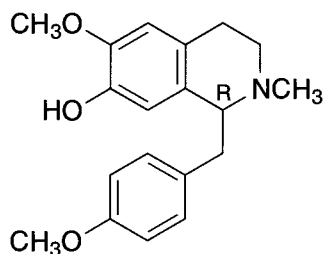
(-)-isomer:

*Ocotea caesia* (Lauraceae) jnp 42, 325 '79

isomer not specified:

*Isolona pilosa* (Annonaceae) cra 285, 447 '77*Isolona zenkeri* (Annonaceae) pm 50, 23 '84

6-MeO	7-HO
4-MeO-benzyl	
Me	THIQ

**N-Demethylcolletine**

(R)-isomer:

*Aconitum leucostomum* (Ranunculaceae)

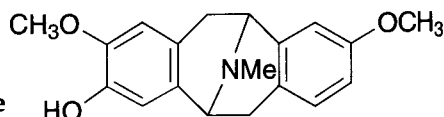
kps 6, 805 '80

*Discaria serratifolia* (Rhamnaceae) jnp 42, 430 '79

*Xylopiya pantheri* (Annonaceae) pm 30, 48 '76

with a (2,3) attack:

**2,9-Dimethoxy-3-hydroxypavinane**



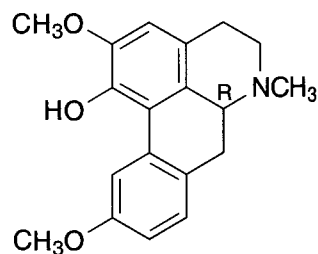
*Argemone munita* (Papaveraceae) joc 38, 3701 '73

also under: 7 MeO R Me THIQ

R= 3,4-MeO,HO-benzyl (6,3) attack

with a (2,8) attack:

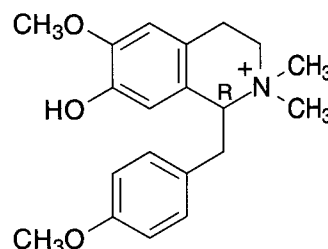
**N-Methylzenkerine  
Pulchine**



*Ocotea caesia* (Lauraceae) jnp 42, 325 '79

6-MeO 7-HO  
4-MeO-benzyl  
Me,Me+ THIQ

**Colletine**



*Colchicum luteum* (Liliaceae) kpr 12, 359 '76

*Colletia spinosissima* (Rhamnaceae)

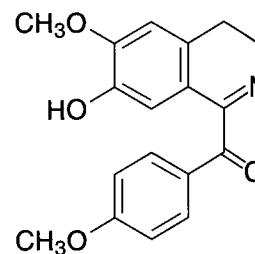
llyd 33s, 1 '70

*Cymbopetalum brasiliense* (Annonaceae) pm 50, 517 '84

*Zanthoxylum sarasinii* (Rutaceae) pm 54, 189 '88

6-MeO 7-HO  
4-MeO- $\alpha$ -keto-benzyl  
H DHIQ

**Velucryptine**

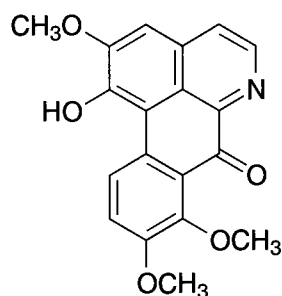


*Cryptocarya velutinos* (Lauraceae) jnp 52, 516 '89

6-MeO	7-HO
2,3-MeO,MeO- $\alpha$ -keto-benzyl	
H	IQ

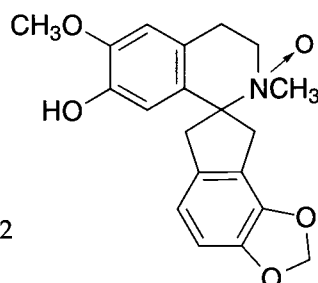
Compound unknown

with a (6,8) attack:

**Annolatine***Annona montana* (Annonaceae) phy 33, 497 '93

6-MeO	7-HO
2,3-MDO-benzyl, Me	
Me	THIQ

Compound unknown

with a (6,1-Me) attack,  
the N-oxide:**(+)-Papracinine***Fumaria indica* (Papaveraceae) phy 31, 2869 '92

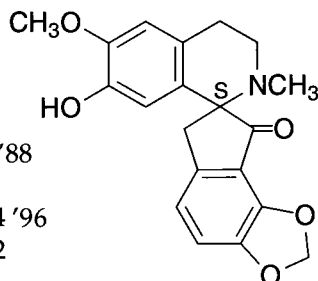
6-MeO	7-HO
2,3-MDO- $\alpha$ -keto-benzyl, Me	
Me	THIQ

Compound unknown

with a (6,1-Me) attack:

**(+)-Parfumine**

*Corydalis rutifolia* (Papaveraceae) ijcdr 26, 155 '88  
*Corydalis solida* (Papaveraceae) guefd 5, 9 '88  
*Fumaria densiflora* (Papaveraceae) cccc 61, 1064 '96  
*Fumaria indica* (Papaveraceae) phy 31, 2869 '92  
*Fumaria muralis* (Papaveraceae) jpps 33, 16 '81



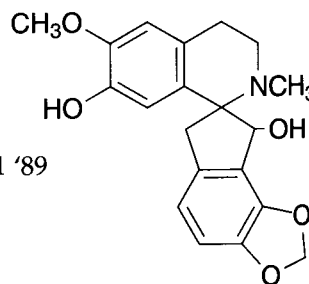
*Fumaria officinalis* (Papaveraceae) jnp 46, 433 '83  
*Fumaria parviflora* (Papaveraceae) pm 45, 120 '82  
*Fumaria rostellata* (Papaveraceae) dban 25, 345 '72

6-MeO	7-HO
2,3-MDO- $\alpha$ -HO-benzyl, Me	
Me	THIQ

Compound unknown

with a (6,1-Me) attack:

**Fumaritine**  
**Fumarophycinol**



(+) -isomer:

*Corydalis caucasica* (Papaveraceae) ijcd 27, 161 '89  
*Corydalis solida* (Papaveraceae) jcsp 13, 63 '91

(-) -isomer:

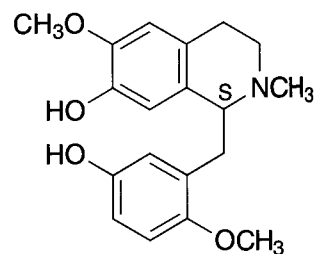
*Corydalis rutifolia* (Papaveraceae) ijcd 26, 155 '88  
*Fumaria bastardii* (Papaveraceae) nps 4, 257 '98  
*Fumaria densiflora* (Papaveraceae) cccc 61, 1064 '96  
*Fumaria macrosepala* (Papaveraceae) aqse 83, 119 '87  
*Fumaria muralis* (Papaveraceae) jppe 33, 16 '81  
*Fumaria officinalis* (Papaveraceae) jnp 46, 433 '83  
*Fumaria* spp. (Papaveraceae) nps 4, 257 '98

the N-oxide:

**Fumaritine N-oxide**  
**Alkaloid Fk-5**

*Fumaria indica* (Papaveraceae) phy 31, 2869 '92  
*Fumaria kralikii* (Papaveraceae) cjc 57, 53 '79

6-MeO	7-HO
2,5-MeO,HO-benzyl	
Me	THIQ

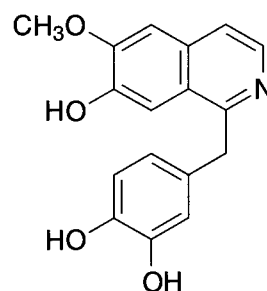
**Dehassiline**

*Dehassia kurzii* (Lauraceae) fit 62, 261 '91

6-MeO	7-HO
3,4-HO,HO-benzyl	
H	IQ

**Turcomanine**

*Berberis turcomanica* (Berberidaceae) cnc 32, 59 '96



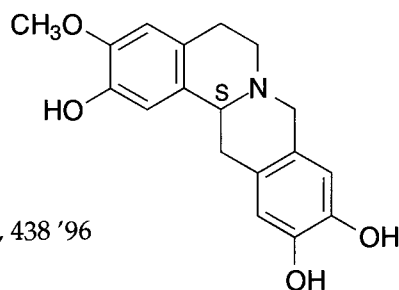
6-MeO	7-HO
3,4-HO,HO-benzyl	
Me	THIQ

**Compound unknown**

with a (6,N-Me) attack:

**(-)-Pessoine**

*Annona spinescens* (Annonaceae) jnp 59, 438 '96



6-MeO	7-HO
3,4-HO,MeO-benzyl	
H	THIQ

**Norreticuline**

(R)(+)-isomer:

*Ficus pachyrrachis* (Moraceae) pm 59, 286 '93

(S)(-)-isomer:

*Annona reticulata* (Annonaceae) phy 26, 3235 '87

*Argemone platyceras* (Papaveraceae) phy 26, 3235 '87

*Berberis aggregata* (Berberidaceae) phy 26, 3235 '87

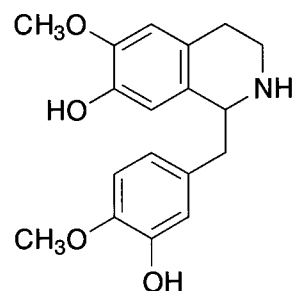
*Berberis aristata* (Berberidaceae) phy 26, 3235 '87

*Berberis beaniana* (Berberidaceae) phy 26, 3235 '87

*Berberis koetoneana* (Berberidaceae) phy 29, 3491 '90

*Berberis stolonifera* (Berberidaceae) phy 26, 3235 '87

*Berberis wilsoniae* var. *subcaulialata* (Berberidaceae) phy 26, 3235 '87

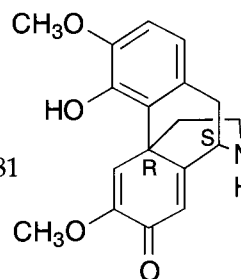


*Chelidonium majus* (Papaveraceae) phy 26, 3235 '87  
*Cissampelos pareira* (Menispermaceae) phy 26, 3235 '87  
*Corydalis cava* (Papaveraceae) phy 26, 3235 '87  
*Corydalis meifolia* (Papaveraceae) tet 42, 675 '86  
*Eschscholzia californica* (Papaveraceae) phy 26, 3235 '87  
*Eschscholzia lobbii* (Papaveraceae) phy 26, 3235 '87  
*Fumaria parviflora* (Papaveraceae) phy 26, 3235 '87  
*Papaver somniferum* (Papaveraceae) phy 26, 3235 '87  
*Thalictrum dipterocarpum* (Ranunculaceae) phy 26, 3235 '87  
*Thalictrum flavum* (Ranunculaceae) phy 26, 3235 '87  
*Thalictrum foetidum* (Ranunculaceae) phy 26, 3235 '87  
*Thalictrum rugosum* (Ranunculaceae) phy 26, 3235 '87

with a (2,4a) attack:

#### Norsinoacutine

*Croton balsamifera* (Euphorbiaceae) llyd 32, 1 '69  
*Croton bonplandianus* (Euphorbiaceae) phy 20, 683 '81  
*Croton flavens* (Euphorbiaceae) rlq 1, 140 '70  
*Croton linearis* (Euphorbiaceae) llyd 32, 1 '69  
*Croton plumieri* (Euphorbiaceae) phy 8, 777 '69



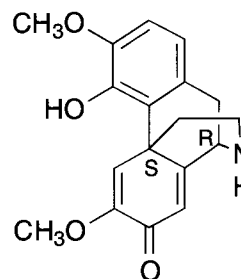
#### Norsalutaridine

(+)-isomer:

*Papaver pseudo-orientale* (Papaveraceae)  
 jnp 51, 802 '88

isomer not specified:

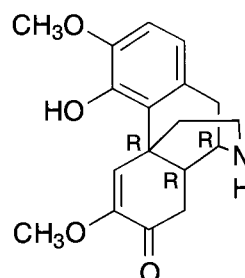
*Croton hemiargyreus* (Euphorbiaceae)  
 phy 47, 1445 '98



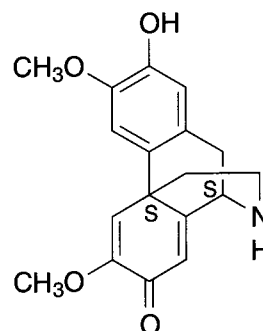
and a hydrogenated double bond  
at the 8,8a-position :

#### 8,14-Dihydronorsalutaridine

*Croton echinocarpus* (Euphorbiaceae) llyd 32, 1 '69  
*Croton linearis* (Euphorbiaceae) llyd 32, 1 '69  
*Croton plumieri* (Euphorbiaceae) phy 8, 777 '69



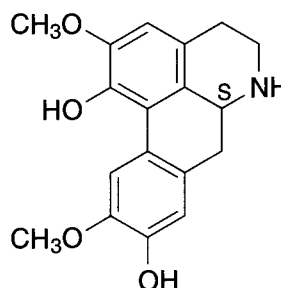
with a (6,4a) attack:

**(-)-Norpallidine***Fumaria vaillantii* (Papaveraceae) phy 15, 1802 '76

with a (6,8) attack:

**Norisoboldine  
Laurelliptine**

*Annona salzmanii* (Annonaceae) je 36, 39 '92  
*Artabotrys monteiroae* (Annonaceae) pa 4, 72 '93  
*Beilschmiedia* spp. (Lauraceae) het 9, 903 '78  
*Cassytha pubescens* (Lauraceae) het 9, 903 '78  
*Cassytha racemosa* (Lauraceae) het 9, 903 '78  
*Cocculus laurifolius* (Menispermaceae) cnc 27, 73 '91  
*Illigera pentaphylla* (Hernandiaceae) jnp 48, 835 '85  
*Litsea acuminata* (Lauraceae) cpj 46, 299 '94  
*Litsea triflora* (Lauraceae) aqsc 76, 171 '80  
*Litsea* spp. (Lauraceae) ajc 22, 2259 '69  
*Monodora tenuifolia* (Annonaceae) daib 45, 520 '84  
*Nectandra rigida* (Lauraceae) jnp 43, 353 '80  
*Neolitsea zeylanica* (Lauraceae) het 9, 903 '78  
*Ocotea caesia* (Lauraceae) phy 28, 3577 '89  
*Ziziphus jujuba* (Rhamnaceae) kps 13, 239 '77

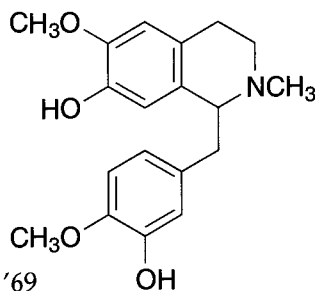


6-MeO	7-HO
3,4-HO,MeO-benzyl	
Me	THIQ

**Reticuline**

(dl):

*Argemone gracilenta* (Papaveraceae) joc 34, 555 '69  
*Machilus duthei* (Lauraceae) jcp 2, 157 '80  
*Ocotea velloziana* (Lauraceae) phy 39, 815 '95  
*Papaver bracteatum* (Papaveraceae) phy 16, 1939 '77





## (+) (S)-isomer:

- Alseodaphne archboldiana* (Lauraceae) het 9, 903 '78  
*Aniba canelilla* (Lauraceae) cjc 71, 1128 '93  
*Annona cherimolia* (Annonaceae) jnp 48, 151 '85  
*Annona* spp. (Annonaceae) jnp 48, 151 '85  
*Argemone* spp. (Papaveraceae) joc 34, 555 '69  
*Artabotrys monteiroae* (Annonaceae) pa 4, 72 '93  
*Artabotrys venustus* (Annonaceae) jnp 49, 602 '86  
*Berberis* spp. (Berberidaceae) phy 29, 3505 '90  
*Bongardia chrysogonum* (Berberidaceae) jnp 52, 818 '89  
*Cananga odorata* (Annonaceae) jccs 46, 607 '99  
*Ceratocarpus palaestinus* (Papaveraceae) jnp 53, 1006 '90  
*Cinnamomum* spp. (Lauraceae) het 9, 903 '78  
*Corydalis* spp. (Papaveraceae) ijcd 26, 155 '88  
*Cryptocarya* spp. (Lauraceae) het 9, 903 '78  
*Cymbopetalum brasiliense* (Annonaceae) pm 50, 517 '84  
*Desmos tiebaghiensis* (Annonaceae) jnp 45, 617 '82  
*Eschscholzia californica* (Papaveraceae) lac 6, 555 '90  
*Fumaria capreolata* (Papaveraceae) pcr 4, 96 '85  
*Glaucium grandiflorum* (Papaveraceae) apt 43, 89 '01  
*Glaucium fimbriigerum* (Papaveraceae) cnc 16, 177 '80  
*Glossocalyx brevipes* (Monimiaceae) jnp 48, 833 '85  
*Guatteria goudotiana* (Annonaceae) phy 30, 2781 '91  
*Hernandia* spp. (Hernandiaceae) bmn 2, 387 '80  
*Illigera parviflora* (Hernandiaceae) cty 22, 393 '91  
*Laurus nobilis* (Lauraceae) jnp 45, 560 '82  
*Leontice leontopetalum* (Berberidaceae) jnp 49, 726 '86  
*Lindera* spp. (Lauraceae) jnp 47, 1066 '84  
*Litsea* spp. (Lauraceae) ajc 43, 1949 '90  
*Magnolia* spp. (Magnoliaceae) pm 48, 43 '83  
*Monocyclanthus vignei* (Annonaceae) jnp 54, 1331 '91  
*Nectandra salicifolia* (Lauraceae) jnp 59, 576 '96  
*Neolitsea* spp. (Lauraceae) jnp 47, 1062 '84  
*Papaver somniferum* (Papaveraceae) kps 12, 750 '76  
*Papaver* spp. (Papaveraceae) phy 25, 2639 '86  
*Peumus boldus* (Monimiaceae) jps 57, 1023 '68  
*Phoebe minutiflora* (Lauraceae) cpj 49, 217 '97  
*Polyalthia acuminata* (Annonaceae) jnp 45, 471 '82  
*Rollinia emarginata* (Annonaceae) jnp 49, 717 '86  
*Siparuna tonduziana* (Monimiaceae) pm 56, 492 '90  
*Sparattanthelium uncigerum* (Hernandiaceae) jnp 48, 333 '85  
*Stephania* spp. (Menispermaceae) cpb 45, 470 '97

*Thalictrum minus chemovar b* (Ranunculaceae) llyd 41, 257 '78  
*Thalictrum* spp. (Ranunculaceae) jnp 45, 252 '82  
*Uvaria* spp. (Annonaceae) nm 51, 272 '97  
*Xylopia* spp. (Annonaceae) pm 30, 48 '76

(-)(R)-isomer:

*Aniba* spp. (Lauraceae) bse 8, 51 '80  
*Anomianthus dulcis* (Annonaceae) bse 26, 139 '98  
*Croton celtidifolius* (Euphorbiaceae) pm 63, 485 '97  
*Ficus pachyrrachis* (Moraceae) pm 59, 286 '93  
*Papaver* spp. (Papaveraceae) phy 25, 2639 '86

isomer not specified:

*Aconitum zeravschanicum* (Ranunculaceae) cnc 20, 760 '84  
*Aniba muca* (Lauraceae) rbq 13, 19 '96  
*Annona squamosa* (Annonaceae) cpj 46, 439 '94  
*Anomianthus dulcis* (Annonaceae) bse 26, 139 '98  
*Arctomecon humile* (Papaveraceae) bse 18, 45 '90  
*Chelidonium majus* (Papaveraceae) jcspt I, 1140 '75  
*Cinnamomum camphora* (Lauraceae) het 9, 903 '78  
*Cocculus laurifolius* (Menispermaceae) tet 36, 3107 '80  
*Corydalis* spp. (Papaveraceae) cnc 20, 245 '84  
*Croton hemiargyreus* var. *gymnodiscus* (Euphorbiaceae) pa 10, 254 '99  
*Cryptocarya longifolia* (Lauraceae) abs 11  
*Dicentra peregrina* (Papaveraceae) cnc 20, 74 '84  
*Doryphora sassafras* (Monimiaceae) llyd 37, 493 '74  
*Erythrina arborescens* (Fabaceae) yz 93, 1617 '73  
*Fumaria vaillantii* (Papaveraceae) cnc 17, 437 '81  
*Glaucium* spp. (Papaveraceae) cnc 19, 714 '83  
*Guatteria* spp. (Annonaceae) pmp 18, 165 '84  
*Gyrocarpus americanus* (Hernandiaceae) jnp 49, 101 '86  
*Hernandia guianensis* (Hernandiaceae) pm 50, 20 '84  
*Hydrastis canadensis* (Ranunculaceae) llyd 33s, 1 '70  
*Laurelia philippiana* (Monimiaceae) phy 21, 773 '82  
*Laurobasidium lauri* (Exobasidiaceae) jpp 40, 801 '88  
*Litsea* spp. (Lauraceae) cpj 46, 299 '94  
*Machilus thunbergii* (Lauraceae) het 9, 903 '78  
*Magnolia salicifolia* (Magnoliaceae) pm 51, 291 '85  
*Ocotea* spp. (Lauraceae) rlq 11, 110 '80  
*Orophea hexandra* (Annonaceae) bse 27, 111 '99  
*Oxandra major* (Annonaceae) phy 26, 2093 '87  
*Pachygone ovata* (Menispermaceae) jnp 42, 399 '79

*Papaver* spp. (Papaveraceae) cnc 24, 475 '89  
*Phoebe* spp. (Lauraceae) jca 667, 322 '94  
*Phyllica rogersii* (Rhamnaceae) llyd 33s, 1 '70  
*Polyalthia nitidissima* (Annonaceae) pm 49, 20 '83  
*Sassafras albidum* (Lauraceae) llyd 39, 473a '76  
*Thalictrum pedunculatum* (Ranunculaceae) izk 21, 246 '88  
*Xylopia frutescens* (Annonaceae) pmp 16, 253 '82  
*Xylopia papuana* (Annonaceae) npl 6, 57 '95

(Beware of the spelling without the final "e." Reticulin is a connective tissue protein.)

**the N-oxide: Reticuline N-oxide**

(+)-isomer:

*Corydalis pseudoadunca* (Papaveraceae) cnc 21, 807 '86  
*Magnolia salicifolia* (Magnoliaceae) pm 48, 43 '83

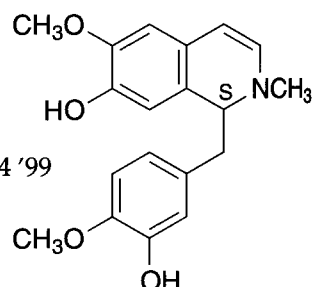
isomer not specified:

*Pachygone ovata* (Menispermaceae) jnp 42, 399 '79

**with a 3,4-ene:**

**$\alpha$ -Dehydroreticuline**

*Croton hemiargyreus* (Euphorbiaceae) pa 10, 254 '99  
*Licaria armeniaca* (Lauraceae) bps 8, 28 '85

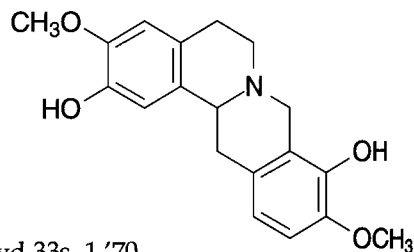


**with a (2,N-Me) attack:**

**Scoulerine  
Aurotensine**

(dl)-Scoulerine  
 Aurotensine:

*Glaucium oxylobum* (Papaveraceae) llyd 33s, 1 '70



## (R)(+)-Scoulerine:

- Corydalis bulleyana* (Papaveraceae) pm 52, 193 '83  
*Corydalis caucasica* (Papaveraceae) ijcd 27, 161 '89  
*Corydalis incisa* (Papaveraceae) cpb 24, 2859 '76  
*Corydalis rutifolia* (Papaveraceae) ijcdr 26, 155 '88  
*Corydalis scouleri* (Papaveraceae) bull 1  
*Corydalis solida* ssp. *brachyloba* (Papaveraceae) jcsp 13, 63 '91

## (S)(-)-Scoulerine:

- Argemone albiflora* (Papaveraceae) cccc 38, 3312 '73  
*Argemone polyanthemis* (Papaveraceae) cccc 39, 2491 '74  
*Corydalis claviculata* (Papaveraceae) phy 24, 585 '85  
*Corydalis decumbens* (Papaveraceae) jcps 4, 57 '95  
*Corydalis gigantea* (Papaveraceae) kps 12, 754 '76  
*Corydalis hsuehowsensis* (Papaveraceae) pm 57, 156 '91  
*Corydalis incisa* (Papaveraceae) phy 13, 2620 '74  
*Corydalis intermedia* (Papaveraceae) cccc 54, 2009 '89  
*Corydalis koidzumiana* (Papaveraceae) yz 94, 844 '74  
*Corydalis majori* (Papaveraceae) pmp 22, 219 '88  
*Corydalis nobilis* (Papaveraceae) cccc 54, 2009 '89  
*Corydalis ochroleuca* (Papaveraceae) cjc 47, 1103 '69  
*Corydalis omeiensis* (Papaveraceae) tcyk 4, 7 '92  
*Corydalis saxicola* (Papaveraceae) zx 24, 289 '82  
*Corydalis severtzovii* (Papaveraceae) cnc 11, 826 '75  
*Corydalis stewartii* (Papaveraceae) pm 58, 108 '92  
*Corydalis vaginans* (Papaveraceae) cnc 12, 118 '76  
*Disepalum pulchrum* (Annonaceae) phy 29, 3845 '90  
*Eschscholzia californica* strain bb (Papaveraceae) tet 47, 5945 '91  
*Eschscholzia lobbii* (Papaveraceae) cccc 41, 2429 '76  
*Eschscholzia oregana* (Papaveraceae) cccc 40, 1095 '75  
*Fumaria asepalae* (Papaveraceae) ijcdr 24, 105 '86  
*Fumaria bella* (Papaveraceae) jnp 49, 178 '86  
*Fumaria capreolata* (Papaveraceae) jnp 48, 670 '85  
*Fumaria judaica* (Papaveraceae) guefd 1, 15 '84  
*Fumaria kralikii* (Papaveraceae) ijcdr 26, 61 '88  
*Fumaria petteri* ssp. *thuretii* (Papaveraceae) ijcdr 26, 61 '88  
*Fumaria vaillantii* (Papaveraceae) phy 22, 2073 '83  
*Glaucium fimbriigerum* (Papaveraceae) cnc 16, 177 '80  
*Hunnemannia fumariaefolia* (Papaveraceae) cccc 45, 914 '79  
*Hypecoum procumbens* (Papaveraceae) jnp 46, 414 '83  
*Sarcocapnos crassifolia* speciosa (Papaveraceae) phy 28, 251 '88  
*Sarcocapnos enneaphylla* (Papaveraceae) phy 30, 1005 '91

*Sarcocapnos saetabensis* (Papaveraceae) phy 30, 2071 '91  
*Stephania cepharantha* (Menispermaceae) cpb 45, 470 '97

isomer not specified:

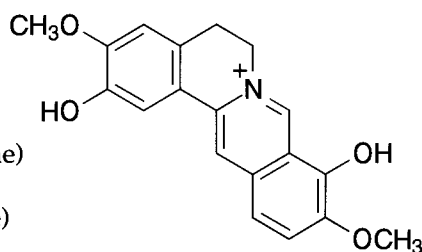
*Annona paludosa* (Annonaceae) pmp 22, 159 '88  
*Argemone alba* (Papaveraceae) cnc 22, 189 '86  
*Argemone albiflora* (Papaveraceae) cnc 22, 742 '87  
*Argemone hybrida* (Papaveraceae) cnc 22, 189 '86  
*Argemone mexicana* (Papaveraceae) cnc 22, 189 '86  
*Argemone orchroleuca* (Papaveraceae) kps 6, 798 '86  
*Berberis valdiviana* (Berberidaceae) fit 64, 378 '93  
*Chelidonium majus* (Papaveraceae) pm 60, 380 '94  
*Coptis japonica* (Ranunculaceae) phy 32, 659 '93  
*Corydalis bungeana* (Papaveraceae) pm 53, 418 '87  
*Corydalis gortschakovii* (Papaveraceae) cnc 20, 245 '84  
*Corydalis impatiens* (Papaveraceae) patent 3  
*Corydalis ochotensis* (Papaveraceae) jcspt I, 390 '77  
*Corydalis pseudoadunca* (Papaveraceae) cnc 21, 807 '86  
*Corydalis repens* (Papaveraceae) yhtp 17, 3 '82  
*Corydalis solida* (Papaveraceae) guefd 5, 9 '88  
*Corydalis stricta* (Papaveraceae) kps 19, 461 '83  
*Corydalis tashiroi* (Papaveraceae) pm 67, 423 '01  
*Cryptocarya longifolia* (Lauraceae) abs 11  
*Dicentra peregrina* (Papaveraceae) cnc 20, 74 '84  
*Dicentra spectabilis* (Papaveraceae) cnc 20, 74 '84  
*Fumaria capreolata* (Papaveraceae) ijcd 23, 161 '85  
*Fumaria densiflora* (Papaveraceae) cccc 61, 1064 '96  
*Fumaria judaica* (Papaveraceae) ijcd 22, 181 '84  
*Fumaria officinalis* (Papaveraceae) cjc 47, 1103 '69  
*Fumaria parviflora* (Papaveraceae) cnc 18, 608 '82  
*Fumaria vaillantii* (Papaveraceae) cnc 17, 437 '81  
*Fumaria* spp. (Papaveraceae) jnp 48, 670 '85  
*Glaucium fimbriigerum* (Papaveraceae) cnc 19, 464 '83  
*Glaucium oxylobum* (Papaveraceae) cccc 50, 854 '84  
*Glaucium squamigerum* (Papaveraceae) cccc 49, 1318 '84  
*Glaucium* spp. (Papaveraceae) cccc 50, 854 '84  
*Mahonia aquifolium* (Berberidaceae) cp 39, 537 '85  
*Nandina domestica* (Berberidaceae) patent 1  
*Papaver argemone* (Papaveraceae) cccc 53, 1845 '88  
*Papaver atlanticum* Ball (Papaveraceae) cccc 51, 2232 '86  
*Papaver bracteatum* (Papaveraceae) rr 24, 400 '88  
*Papaver confine* (Papaveraceae) cccc 54, 1118 '89

*Papaver cylindricum* (Papaveraceae) pm 46, 175 '82  
*Papaver fugax* (Papaveraceae) kps 4, 559 '88  
*Papaver lecoquii* (Papaveraceae) cccc 46, 2587 '81  
*Papaver litwinowii* (Papaveraceae) cccc 46, 1534 '81  
*Papaver orientale* (Papaveraceae) cccc 56, 1534 '91  
*Papaver pinnatifidum* (Papaveraceae) cccc 59, 1879 '94  
*Papaver rhoeas* var. *chelidonioides* (Papaveraceae) cccc 54, 1118 '89  
*Papaver setigerum* (Papaveraceae) cccc 61, 1047 '96  
*Papaver stevenianum* (Papaveraceae) cccc 55, 1812 '90  
*Papaver tauricolum* (Papaveraceae) phy 19, 2189 '80  
*Papaver triniaefolium* (Papaveraceae) pm 49, 43 '83  
*Stylophorum lasiocarpum* (Papaveraceae) cccc 56, 1116 '91  
*Stylophorum diphyllum* (Papaveraceae) cccc 49, 704 '84  
*Thalictrum tuberosum* (Ranunculaceae) phy 33, 1431 '93

and aromatization of the c-ring:

#### Tetradehydroscoulerine

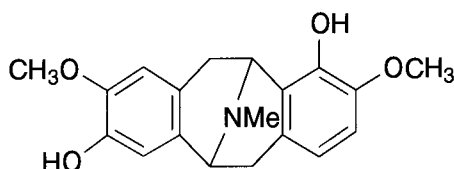
*Pseuduvaria indochinensis* (Annonaceae)  
 phy 27, 4004 '88  
*Thalictrum tuberosum* (Ranunculaceae)  
 phy 33, 1431 '93



with a (2,3) attack:

#### Munitagine

*Argemone hybrida* (Papaveraceae) cnc 22, 189 '86  
*Argemone gracilentia* (Papaveraceae) jnp 46, 293 '83  
*Argemone munita* (Papaveraceae) jnp 46, 293 '83  
*Argemone platyceras* (Papaveraceae) kfz 22, 580 '88  
*Argemone pleiacantha* (Papaveraceae) phy 8, 611 '69



also under: 7,8 MeO HO R Me THIQ  
 R= 3,4-MeO,HO-benzyl (6,3) attack

with a (2,4a) attack:

**Salutaridine**  
**Floripavine**  
**Salutarine**  
**Sinoacutine**  
**Sinacutine**

(+)-Salutaridine

Floripavine:

*Croton balsamifera* (Euphorbiaceae) rlq 1, 140 '70

*Croton plumieri* (Euphorbiaceae) rlq 1, 140 '70

*Croton* spp. (Euphorbiaceae) llyd 32, 1 '69

*Glaucium fimbriigerum* (Papaveraceae)

jnp 61, 1564 '98

*Glaucium flavum* (Papaveraceae) phy 27, 1021 '88

*Glaucium* spp. (Papaveraceae) jnp 61, 1564 '98

*Papaver bracteatum* (Papaveraceae) cccc 50, 1215 '85

*Papaver fugax* (Papaveraceae) jsiri 7, 263 '96

*Papaver orientale* (Papaveraceae) book 4

*Papaver pseudo-orientale* (Papaveraceae) cccc 51, 1752 '86

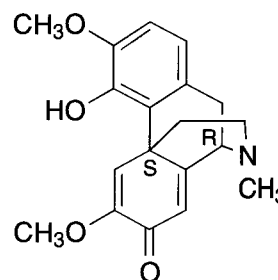
*Papaver somniferum* (Papaveraceae) book 4

*Papaver triniifolium* (Papaveraceae) pm 49, 43 '83

*Papaver* spp. (Papaveraceae) dsa 7, 93 '83

*Sarcocapnos crassifolia* (Papaveraceae) phy 30, 1175 '91

*Sarcocapnos saetabensis* (Papaveraceae) phy 30, 1175 '91



(-)-Salutaridine

(-)-Sinoacutine

Sinacutine:

*Artabotrys uncinatus* (Annonaceae) jnp 64, 1157 '01

*Berberis buxifolia* (Berberidaceae) daib 44, 1458 '83

*Berberis ilicifolia* (Berberidaceae) het 43, 949 '96

*Cassytha pubescens* (Lauraceae) het 9, 903 '78

*Ceratocapnos palaestinus* (Papaveraceae)

jnp 53, 1006 '90

*Cocculus carolinus* (Menispermaceae) jps 61, 1825 '72

*Corydalis koidzumiana* (Papaveraceae) yz 94, 844 '74

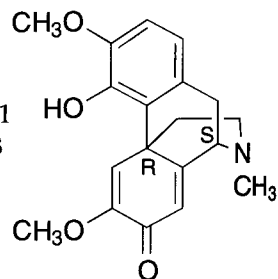
*Corydalis major* (Papaveraceae) pmp 22, 219 '88

*Corydalis ochotensis* var. *raddeana* (Papaveraceae) jcspt I, 390 '77

*Corydalis stewartii* (Papaveraceae) pm 58, 108 '92

*Croton flavens* (Euphorbiaceae) llyd 32, 1 '69

*Croton lechleri* (Euphorbiaceae) pm 62, 90 '96



*Glaucium contortuplicatum* (Papaveraceae) jps 65, 755 '76  
*Nandina domestica* (Berberidaceae) yz 94, 1149 '74  
*Ocotea brachybotra* (Lauraceae) tl 1631 '76  
*Peumus boldus* (Monimiaceae) fit 54, 175 '83  
*Platycapnos saxicola* (Papaveraceae) phy 30, 3315 '91  
*Stephania brachyandra* (Menispermaceae) tcyk 4, 11 '92  
*Stephania cepharantha* (Menispermaceae) bpb 22, 268 '99  
*Stephania dicentziniifera* (Menispermaceae) zh 15, 8 '84  
*Stephania dielsiana* (Menispermaceae) zh 14, 57 '83  
*Stephania elegans* (Menispermaceae) injp 42, 147 '80  
*Stephania epigaea* (Menispermaceae) nyx 5, 203 '85  
*Stephania gracilentia* (Menispermaceae) injp 3, 8 '87  
*Stephania micrantha* (Menispermaceae) yx 16, 557 '81  
*Stephania officinarum* (Menispermaceae) zx 32, 368 '90  
*Stephania pierrei* (Menispermaceae) jnp 56, 1468 '93  
*Stephania yunnanensis* (Menispermaceae) zx 31, 296 '89  
*Strychnopsis thouarsii* (Menispermaceae) bse 23, 679 '95

(dl)-Salutaridine

(dl)-Salutarine: (structure the same as (+)-Salutaridine)

*Croton salutaris* (Euphorbiaceae) phy 20, 543 '81

isomer not specified:

*Antizoma angustifolia* (Menispermaceae) jnp 51, 584 '88

*Croton linearis* (Euphorbiaceae) rlq 1, 140 '70

*Sinomenium acutum* (Menispermaceae) llyd 33s, 1 '70

*Thalictrum foetidum* (Ranunculaceae) pm 56, 337 '90

the N-oxide: (+)-Salutaridine N-oxide

*Papaver bracteatum* (Papaveraceae) pm 58, 368 '92

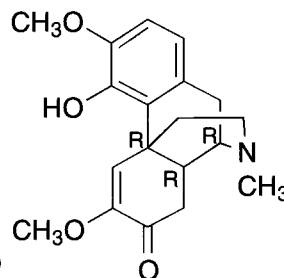
and a hydrogenated double bond  
at the 8,8a-position :

(-)-8,14-Dihydrosalutaridine

*Croton discolor* (Euphorbiaceae) llyd 32, 1 '69

*Croton echinocarpus* (Euphorbiaceae) llyd 32, 1 '69

*Croton linearis* (Euphorbiaceae) llyd 32, 1 '69

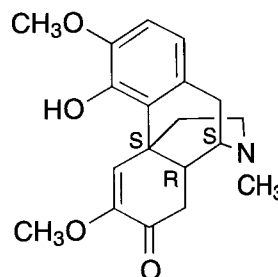




*Croton plumieri* (Euphorbiaceae) phy 8, 777 '69  
*Croton stenophyllus* (Euphorbiaceae) rcf 16, 45 '82  
*Sinomenium acutum* (Menispermaceae) bydx 23, 235 '91  
*Stephania brachyandra* (Menispermaceae) cty 13, 1 '82

**(-)-Ocobotrine**

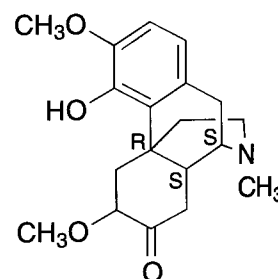
*Hernandia voyronii* (Hernandiaceae) pm 64, 58 '98  
*Ocotea brachybotra* (Lauraceae) tl 1631 '76  
*Thalictrum fauriei* (Ranunculaceae)  
 jnp 62, 803 '99



and hydrogenated double bonds:

**Tetrahydrosinacutine**

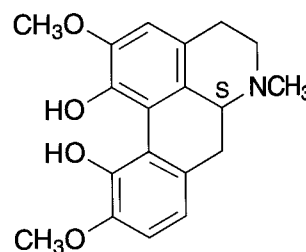
*Ocotea brachybotra* (Lauraceae) fes 32, 767 '77



with a (2,8) attack:

**Corytuberine**

*Aconitum* spp. (Ranunculaceae)  
 cccc 60, 1034 '95  
*Actaea spicata* (Ranunculaceae)  
 cccc 60, 1034 '95  
*Adonis* spp. (Ranunculaceae) cccc 52, 804 '87  
*Annona cherimolia* (Annonaceae) jnp 48, 151 '85  
*Aquilegia* spp. (Ranunculaceae) cccc 52, 804 '87  
*Aristolochia clematidis* (Aristolochiaceae) cccc 52, 804 '87  
*Caltha palustris* (Ranunculaceae) cccc 52, 804 '87  
*Chelidonium majus* (Papaveraceae) pm 60, 380 '94  
*Cissampelos pareira* (Menispermaceae) fit 63, 282 '92  
*Clematis recta* (Ranunculaceae) cccc 52, 804 '87  
*Consolida regalis* (Ranunculaceae) cccc 52, 804 '87  
*Corydalis dasyptera* (Papaveraceae) tcyk 9, 37 '97  
*Corydalis gortschakovii* (Papaveraceae) cnc 13, 702 '77  
*Corydalis nobilis* (Papaveraceae) cccc 54, 2009 '89



## Journal Names Appendix

CODE	JOURNAL NAME
aa	Acta Amazonica
aabc	Anales Acad. Brasil Cienc.
aajps	Al-Azhar Journal of Pharm. Sci.
aaqa	An. Asoc. Quimica Argentina
abb	Arch. Biochem. Biophys.
abc	Agr. Biol. Chem.
abf	Ann. Bot. Fenn.
abs	(see ABSTRACTS below)
ac	Anal. Chem.
acc	Acta Crystallog., Commun.
accc	Acta Crystallog., Sec. C Commun.
acr	Anticancer Research
acrc	Acgc Chem. Res. Commun.
acs	Acta Chimica Scandinav.
acssb	Acta Chimica Scandinav., Ser. B
acv	Acta Cient. Venze.
adq	Anales De Quimica
afb	Acta Farm. Bonaerense
aim	Annals of Internal Medicine
ajb	American Journal of Botany
ajc	Australian Journal of Chemistry
ajps	Alexandria Journal of Pharm. Sci.
akz	Arm. Khim. Zh.
al	Acta Leidensia
ap	Arch. Pharm. (Germany)
apf	Ann. Pharm. France
apj	Acta Pharm. Jugosl.
apn	Acta Pharm. Nord.
app	Acta Pol. Pharm. (Poland)
apr	Archives of Pharm. Res.
aps	Acta Pharm. Suecica
apt	Acta Pharm. Turc.
apw	Arch Pharm. (Weinheim)
aq	An. Quim.
aqsc	An. Quim. Ser. C

arch	Arch. Androl.
aua	Ann. Univ. Abidjan Ser. C
aup	Acta Univ. Palacki. Olomuc., Fac. Rerum Nat., Chem.
babf	Bol. Assoc. Brasil Farm.
bbb	Biosci. Biotech. Biosci.
bc	Biomed. Chromatography
bcm	Bull. Chinese Materia Medica
bcsj	Bull. Chem. Soc. Japan
ber	Chemische Berichte
bfs	Bull. Fac. Sci., Assiut University
bgac	Bulletin Georgian Acad. Sci.
bio	Biokhimiya
bkcs	Bulletin Korean Chem. Soc.
bmcl	Bioorg. Med. Chem. Letters
bmnh	Bull. Mus. Natl. Hist. Nat. Sect. B
book	(see BOOKS below)
bp	Biochem. Pharmacology
bpb	Biol. Pharm. Bulletin
bps	Bull. Pharm. Sci. Assiut Univ.
br	Brain Res.
bs	Biosciences
bscq	Biol. Soc. Chil. Quim.
bs&e	Biochem. Systematics & Ecol.
bscf	Bull. Soc. Chim. Fr.
bscq	Bull. de la Soc. Chilena de Quimica
bsp	Bull. Sci. Pharmacology
bsrs	Bull. Soc. R. Sci. Leige
bull	(see BULLETINS below)
bydx	Beijing Yike Daxue Xuebao
CA	Chemical Abstracts
cb	Chem. Ber.
cc	Chem. Communications
cccc	Coll. Czec. Chem. Comm.
ccl	Chinese Chem. Letters
cct	Contrib. Cient. Tecnol. (Univ. Tec. Estado, Santiago)
cf	Cesk. Farm.
chem	Chemica
chim	Chimia
chr	Chromatographia
chy	Chung-Hua Yao Hsueh Tsa Chih
ci	Chem. Ind. (London)
cjc	Canadian Journal of Chemistry
cjr	Canadian Journal of Research

cl	Chem. Letters
cnc	Chem. Nat. Comp.
cp	Chem. Pap.
cpb	Chem. Pharm. Bulletin
cpj	Chinese Pharmaceut. Journal
cra	C. R. Acad. Sci., Ser. C
crab	C. R. Acad. Bulg. Sci.
crhs	C. R. Hebd. Seances Acad. Sci., Ser. C
crt	Chem. Res. Toxicol.
ct	Clinical Toxicology
cty	Chung Ts'ao Yao
cwf	Chih Wu Fen Lei Hsueh Pao
cwhp	Chih Wu Hsueh Pao
cytp	Chung Yao T'ung Pao
cz	Chem. Zvesti
daib	Dissertation Abstracts Int. b
dant	Dokl. Akad. Nauk Tadzh. SSR
dban	Dokl. Bolg. Akad. Nauk
diss	(see DISSERTATIONS below)
dmd	Drug Metab. Dispos.
dsa	Doga Seri A
duj	Dirasat-Univ. Jordan Ser. b
eb	Economic Botany
ejcp	Eur. J. Clin. Pharmacology
ejps	Egypt Journal of Pharm. Sci.
exp	Experientia
fes	Farmaco Ed. Sci.
ffbd	Fabad. Farm. Bilimler Derg.
fit	Fitoterapia
fm	Folia Med.
frm	Farmatsiya (Moscow)
fzs	Faming Zhuanli Shenqing Gongkai Shoumingshu
gci	Gazetta Chimica Italiana
go	Garcia Orta
gp	General Pharmacology
guefd	Gazi. Univ. Eczacilik Fak. Derg.
hca	Helvetica Chimica Acta
het	Heterocycles
hh	Herba Hung
hhhp	Hua Hsueh Hsueh Pao
hkkuc	Hwahak Kwa Kongop Ui Chinbo
hue	Hacettepe Univ. Eczacilik Fak. Derg.
hx	Huaxue Xuebao

hyz	Huaxi Yaoxue Zazhi
iang	Izv. Akad. Nauk Gruz., Ser. Khim.
ians	Izv. Akad. Nauk SSSR Ser. Khim.
iant	Izv. Akad. Nauk Tadzh. SSR Otd. Fiz. Mat. Khim. Geol. Nauk
id	Indian Drugs
ijc	Indian Journal of Chem. Sec. B
ijcdr	Int. Journal of Crude Drug Res.
ijcs	Indian Journal of Chem. Soc.
ijeb	Indian Journal of Exp. Biol.
ijhc	Indian Journal of Heterocycl. Chem.
ijnp	Indian Journal of Natural Products
ijp	Int. Journal of Pharmacognosy
ijps	Indian Journal Pharm. Sci.
ik	Iyakuhin Kenkyu
izk	Izv. Khim.
jacs	Journal of American Chemical Society
jafc	Journal of Agric. & Food Chem.
jap	Journal of Amer. Pharm. Ass. Sci. Ed.
jbas	Journal of Bangladesh Acad. Sci.
jc	Journal of Chromatography
jca	Journal of Chromatography A
jcc	Journal of Chem. Crystal.
jccs	Journal of Chin. Chem. Soc. (Taipei)
jcp	Journal of the Chem. Soc. of Pakistan
jcps	Journal of Chinese Pharm. Science
jcpu	Journal of Chinese Pharm. University
jcr	Journal of Chemical Research
jers	Journal of Chemical Research Synop.
jesc	Journal of the Chemical Society-C
jcscc	Journal of the Chemical Society-Chem. Communications
jcp	Journal of Chem. Soc. Pakistan
jcspt	Journal of the Chemical Society-Perkins Transactions
jcsr	Journal of Crystallographic & Spectroscopic Res.
je	Journal of Ethnopharmacology
jfp	Journal of Fac. Pharm. Istanbul Univ.
jhc	Journal of Heterocyclic Chem.
jic	Journal of Inst. Chem. (Calcutta)
jics	Journal of the Indian Chem. Soc.
jnp	Journal of Natural Products
jnr	Journal of Neuroscience Research
jnsc	Journal of Natl. Sci. Council Sri Lanka
joc	Journal of Organic Chemistry

joe	Journal of Ethnopharmacology
jp	Journal of Pharm.
jpac	Journal of Proc. Inst. Chem. (India)
jpp	Journal of Pharm. Pharmacol.
jpps	Journal of Pharm. Pharmacol. Suppl.
jps	Journal of Pharmaceutical Science
jpsj	Journal of Pharm. Society Japan
jrim	Journal of Res. Indian Med. Yoga Homeopathy
jscs	Journal of Serb. Chem. Soc.
jsiri	Journal of Sci. Islamic Repub. Iran
kdr	Kagoshima Daigaku Rigakubu Kiyo Sugaku Butsurigaku Kagaku
kfz	Khim. Farm. Zh.
kjp	Korean Journal of Pharmacognosy
kps	Khimiya Prirodnikh Soedinenii
lac	Liebigs Ann. Chem.
llyd	Lloydia
lr	Lekarstv. Rasteniya
ls	Life Science
mjps	Mansoura Journal of Pharm Sci.
mjs	Malaysian Journal of Science
nasb	National Applied Science Bulletin
nat	Nature
ncyh	Nan-Ching Yao Hsueh Yuan Hsueh Pao
nei	Neirokhimiya
nl	Neuroscience Letters
nm	Natural Medicine
nmt	Natural Medicine, Tokyo
npl	Natural Products Letters
nps	Natural Products of Science
nr	no reference
nyx	Nanjing Yixueyuan Xuebao
oiz	Okayama Igakkai Zasshi
ojc	Orient. Journal of Chemistry
omr	Org. Magn. Reson.
pa	Phytochemical Analysis
patent	(see PATENTS below)
paz	Pazhoohandeh (Tehran)
pb	Pharm. Bull.
pbl	Pharm. Biol. (Netherlands)
pcbr	Prog. Clin. Biol. Res.
pcj	Pharm. Chem. Journal
pcl	Pharmacologist

pcr	Plant Cell Rep.
pcs	Proceedings of the Chemical Society
pct&oc	Plant Cell Tissue & Organ Culture
pert	Pertanika
phy	Phytochemistry
phymed	Phytomedicine
phzi	Pharmazie
pjps	Pakistan Journal of Pharm. Sci.
pjsr	Pakistan Journal of Sci. Res.
pm	Planta Medica
pmj	Pahlavi Med. Journal
pmpp	Planta Medica Phytother.
pms	Planta Medica Supp.
pnscc	Proceedings of the National Sci. Council, Rep. China
pp	Plant Physiology
pptp	Phytochem. Potential Trop. Plants
pr	Phytotherapy Research
prs	Phytotherapy Research Supp.
psj	Pharm. Soc. Japan
ptn	Phyton (Horn, Austria)
pw	Pharm Weekbl. (Sci. Ed.)
qn	Quim. Nova
rbf	Rev. Brasil Farm
rbp	Rev. Brasil Plant Med.
rbq	Rev. Boliv. Quimica
rcf	Rev. Cubana Farm.
rcq	Rev. Colomb. Quimica
rlq	Rev. Latinoam. Quimica
rr	Rastit. Resur.
ryz	Redai Yaredai Zhiwu Xuebao
san	Soobshch. Akad. Nauk Gruz. SSR
sci	Science
sh	Saengyak Hakhoechi
sp	Sci. Pharm.
svs	Sb. Vys. Sk. Zemed. Praze, Fak. Agron., Rada A
sy	Synth. Commun.
syn	Synthesis
syx	Shenyang Yaoxueyuan Xuebao
sz	Shoyakugaku Zasshi
taxon	Taxon
tcdh	Tap Chi Duoc Hoc
tcyyk	Tianran Chanwu Yanjiu Yu Kaifa
tet	Tetrahedron

teta	Tetrahedron-Asymmetry
tjc	Turkish Journal of Chemistry
tl	Tetrahedron letters
tox	Toxicon
tyhtc	Taiwan Yao Hsueh Tsa Chih
ws	Wakanyaku Shinpojumu
yfz	Yaowu Fenxi Zazhi
yg	Yiyao Gongye
yh	Youji Huaxue
yhc	Yakhak Hoe Chi
yhhp	Yao Hsueh Hsueh Pao
yhtp	Yao Hsueh T'ung Pao
yt	Yaouxue Tongbao
yx	Yaouxue Xuebao
yz	Yakugaku Zasshi
zh	Zhongcaoyao
zk	Zhongyaocao Keji
zpf	Z Pflanzenphysiol
zpn	Zb. Prir. Nauke
zx	Zhiwu Xuebao
zydx	Zhonggou Yaoke Daxue Xuebao
zyhz	Zhonggou Yaowu Huaxue Zazhi
zyz	Zhonghua Yaouxue Zazhi
zzz	Zhongguo Zhongyao Zazhi

## ABSTRACTS

abs 1	Abstr 23rd Annual Meeting American Society of Pharmacognosy, Aug. 1-5 (1982) Pittsburgh, PA: Abstr-26
abs 2	Abstr Joint Meeting American Society of Pharmacognosy and Society for Economic Botany, July 13-17 (1981) Boston, MA :31-
abs 3	Abstr Internat Res Cong Nat Prod Coll Pharm UNC Chapel Hill, NC, July 7-12 (1985): Abstr-19
abs 4	Proc 1st Int Conf Chem Biotechnol Biol Act Nat Prod (1981) B Atanasova(Ed) Bulgarian Acad Sci Sofia, 3 1:74-
abs 5	Proceedings of the 38th Asms Conference on Mass Spectrometry and Allied Topics: (1990)



- abs 6 Int Conf Chem Biotechnol Biol Act Nat Prod (Proc)  
1st 3 1:95-97 (1981)
- abs 7 Plant Tissue Cult Proc Int Congr Plant Tissue Cell Cult  
5th (1982) :315-316
- abs 8 Tezisy Dokl Molodezhnaya Konf Org Sint Bioorg Khim  
(1976):59-60
- abs 9 Abstr Internat Res Cong Nat Prod Coll Pharm, UNC  
Chapel Hill, NC, July 7-12 (1985):Abstr-61
- abs 10 Proc Fifth Asian Symposium on Medicinal Plants and  
Spices, Seoul, Korea, Aug. 20-24 (1984)  
Bh Han Ds Han Yn Han and Ws Woo(Eds) 5:509-518
- abs 11 Abstr 4th Asian Symp Med Plants Spices, Bangkok,  
Thailand, Sept. 15-19 (1980):170-
- abs 12 Proc Int Symp Recent Adv Nat Prod Res, Seoul, Korea,  
Dec. 14-16 (1979):18-23
- abs 13 Proc 25th Symp on the Chem of Nat Prod, Tokyo (1982)  
25:353-360
- abs 14 Biochem. Physiol. Alkaloide, Int. Symposium, 4th, (1972)  
Meeting Date 1969, 275-8. Publisher: Akad.-Verlag,  
Berlin, E. Germany.
- abs 15 Revista de la Facultad de Ciencias Quimicas  
Universidad Nacional de la Plata 6, 75 (1930)
- abs 16 Abstr 27th Annual Meeting American Society of  
Pharmacognosy, July 27-30 (1986), Ann Arbor, MI:  
Abstr-49

## BOOKS

- book 1 Scientific Basis of Traditional Chinese Medicine, Y. Lau &  
J.P. Fowler (Eds) p. 45 (1982)

- book 2            Chinese Herbal Medicine. US Dept. of Health, Education and Welfare, Publ. No. (NIH) 75-732, Washington,DC  
Li,Cp: Book (1974)
- book 3            Adv Nat Prod Chem-Extraction & Isolation of  
Biologically Active Compounds. S. Natori, N. Ikekawa,  
M. Suzuki (Eds.), Wiley, NY:240-248 (1981)
- book 4            Opium Poppy. Botany, Chemistry, and Pharmacology.  
Kapoor, L.D., Hayworth Press (1995)
- book 5            Sacred Cacti. K. Trout, Better Days Publication (1999)
- book 6            Cactus Alkaloids. K. Trout, Better Days Publication,  
in press

## BULLETINS

- bull 1            Ars, Usda, Tech Bull 1234, Supt Documents,  
Govt Print Office, Washington DC (1961)

## DISSERTATIONS

- diss 1            Dissertation-Ph.D.-Univ Illinois Medical Center (1979):  
pp 171-

## PATENTS

- patent 1          Patent-Japan Kokai Tokkyo Koho-08 208,651: 7pp-(1996)  
Ca 125:257165y
- patent 2          Patent-USSR-721,101:1pp-(1980) Gindarine
- patent 3          Faming Zhuanli Shenqing Gongkai Shoumingshu (2001)  
CA 135:142208
- patent 4          Faming Zhuanli Shenqing Gongkai Shoumingshu (2000)  
CA 134:120918